

C.—THE FISHERY RESOURCES AND FISHING-GROUNDS OF ALASKA.

BY TARLETON H. BEAN.¹

15. THE FISHERY RESOURCES OF ALASKA.

The Territory of Alaska has seventy-five species of food-fishes, seven-eighths of which are strictly adapted to the use of man, the balance being more suitable for bait. More than one-half of this number are widely distributed. More than two-thirds of the whole number exist in great abundance where they occur.

The flat-fishes and flounders (*Pleuronectidae*) have representatives on all parts of the coast; the number of species is, however, smaller north of Unalashka than is found around the shores of the Gulf of Alaska and its groups of islands.

The codfishes (*Gadidae*) are equally divided between Southern and Northern Alaska, the southern species excelling the northern in size; of these the pollock is one of the best baits known for cod.

There are thirteen species of sculpins (*Cottidae*), nearly all of which are important as food, the scaly sculpins (*Hemilepidotus*) being especially good.

Although the number of species of *Sebastichthys* is much smaller than on the Californian coast, the five that do occur in the waters of Southern Alaska are all excellent, and two of these are known from as far north as Kodiak.

The so-called "rock-cod" (species of *Hexagrammus*) rank with the preceding in good qualities, and they are extremely abundant, some species reaching as far north as Port Clarence; *Hexagrammus asper* of Steller is found all along the coast from Sitka westward to Attu. These fishes are generally known to the Russians and largely to the Aleuts as the "tor-poog"; one species (*H. ordinatus*, Cope) is the "green-fish," so called on account of the green color of its flesh, which is nevertheless quite palatable; the green color disappears in the process of cooking; the "green-fish" is remarkable for another peculiarity in its smoky brown ova. One of the most important members of this family of *Chiridae* is the "striped fish," "yellow-fish," or "Atka-mackerel," *Pleurogrammus monopterygius* (Pallas) Gill, which, besides its own intrinsic value as an edible fish, possesses rare worth as a bait for cod.

The family of *Trachinidae* is represented by one species called "cusk" at the Shumagins, a fish which was too rare in museums for us to try its table qualities, although it forms an element in the bait-supply for cod.

¹The report of Dr. Bean might, with almost equal propriety, be included in the section devoted to the methods of the fisheries, but since it is in the main a discussion of undeveloped resources it is deemed more fitting to include it in the section devoted to the fishing-grounds.—G. BROWN GOODE.

There is one species of sand lance or "lant" (*Ammodytes personatus*) which is extremely abundant in most parts of Alaska, and extends north to Point Belcher, as we certainly know; this lance is largely useful in the cod fishery and in general hook-fishing in Southern Alaska as well; its abundance is wonderful.

The pike (*Esox lucius*, L.) we have from Slave Lake; it is "common in all the lakes and ponds of . . . Northern Alaska, but absent from the rivers. It is caught with seines in summer and early winter. It is principally used for dog-feed, being of little value for the table."¹

The family *Microstomatidae* as distributed in Alaska includes the smelts (two species), the capelin, the surf-smelts (two species), and the eulachon. The smelt, which is most abundant and important, resembles the common species of the Atlantic seaboard very closely; it may be, too, that the second form, which is remarkably slender posteriorly, is merely the spent female of the first. The distribution of these fish is probably northerly, as the National Museum has no examples from any point south of Saint Michael's; Steindachner, the describer of *Osmerus dentex*, had it from De Castrie's Bay. We obtained, September 6, 1880, from Eskimo, in Eschscholtz Bay, dried smelt which they had prepared for food. The capelin (*Mallotus villosus*) is universally and abundantly present throughout the Territory; it plays a very important part in the salmon and cod fishery, forming as it does the principal food of these fishes during a part of the summer. Young capelin are extremely abundant north of the Arctic circle, but we have not seen them in Southern Alaska; the number annually consumed by cod and salmon must be enormous. I have taken forty from the stomach of a single cod on Portlock Bank; salmon may be seen in pursuit of capelin even in the brackish waters where small streams fall into the bays and coves. The species of *Hypomesus*, though of small size, form a considerable portion of the food-supply; one of them is known in southern waters (*H. pretiosus*); the other, instead of spawning in the surf like its southern congener, runs into fresh-water ponds to perform this function, and seems to be confined to Northern Alaska and Northeastern Siberia. A well-known representative of the family of *Microstomatidae* is the eulachon or candle-fish (*Thaleichthys pacificus*), an inhabitant of the shores of the whole Gulf of Alaska. The uses and the mode of capture by Indians of surf-smelts and eulachon are so well explained by Mr. Swau in the "Proceedings of the National Museum,"² that it is unnecessary to add anything to that portion of the subject. Eulachon have been salted at Katmai on the peninsula of Alaska and brought to Saint Paul, Kodiak. Mr. B. G. McIntyre, who gave me information concerning this industry, and furnished some examples of the product, speaks highly of the table qualities of salted eulachon. Unfortunately there is no harbor at Katmai, else it might become the seat of an important trade in this article.

The whitefishes (*Coregonidae*) form one of the great staples of food in Northern Alaska (from the Yukon northward), replacing the salmon almost entirely in the extreme north. There are five species of *Coregonus*, the largest of which, as represented in the collections of the National Museum, was once considered identical with the common *clupeiformis*³ of the Great Lakes; it is the fish for which Milner proposed the name *Kennicotti*, and is quite distinct from the *clupeiformis*; this is the "Broad Whitefish" of Mr. Dall, which he says: "Is the next in size of the Alaska

¹ DALL, in Report of the Commissioner of Agriculture, 1871 (for 1870), 357.

² Vol. III, pp. 43 and 257.

³ *Stenodus Mackenzii* is the species referred to by Mr. Dall in the "Report of the Commissioner of Agriculture for 1870," page 386, as the "Great Whitefish," concerning which he says: "This enormous whitefish is the finest of its tribe, both in size and flavor. It is found in the rivers most of the year, but is most plentifully obtained and is in its best condition about the months of June and July. We have seen them four feet long and weighing about fifty pounds. It is distinguished by its long nose and slender form, and is of a silvery white, somewhat darker above. It is full of spawn from September to January, when it disappears."

whitefish, and reaches a weight of thirty pounds. It is distinguished by its broad body, short head, and large scales. It is usually very fat and excellent eating. It abounds in both winter and summer, spawning in September in the small rivers falling into the Yukon." The "Round-fish" of Mr. Dall's paper is *Coregonus quadrilateralis*, Rich. "A long, slender, subcylindrical fish, not very abundant, but of excellent quality. They are caught occasionally throughout the winter on the Yukon, and are distinguished by their attenuated muzzle and peculiar form." The "Humpback" of Mr. Dall is related to *clupeiformis*, from which it is separated by its arched and compressed back. The "whitefish" (Russian *Morskoi ciga*) is *C. Lauretta*, Bean. Mr. Dall says of the *Morskoi ciga*: "This is the most abundant and best flavored species of *Coregonus* in most localities. It is distinguished by its small scales, fins, tail, and head, and is of symmetrical proportions and moderate size. It rarely exceeds three pounds in weight, and is the staple article of food in winter on the Yukon." *Coregonus Lauretta* is the prevailing species of the far north; the writer obtained it in Port Clarence while in company with the United States Coast and Geodetic Survey Expedition to Alaska, in 1880, and Capt. C. L. Hooper, commanding the Revenue-Marine steamer *Corwin*, thus records it from Point Barrow in his report to the Treasury Department of November 1, 1880:

"The temperature of the water was 40° F. We bought from the natives some eider ducks, which were found to have a strong fishy taste, and some fish resembling shad, but smaller and very fat; they differ also from the shad in having two double [misprint for dorsal] fins. We saw the same species in Kotzebue Sound and at other places within the Arctic circle. They are called by the natives 'tupook.' I preserved some specimens for the Smithsonian Institution."

The "Nulato whitefish" (Russian "*Nulatoski ciga*") is evidently what I have called in my list of Alaskan food-fishes *Coregonus Merkii*, Günther, variety. This is a small, thin, bony species, common near Nulato, on the Yukon, and is rarely more than half a pound in weight. It is of little use as food, and is principally abundant in summer. Captain Hooper forwarded to the Smithsonian Institution many specimens of this whitefish, which he obtained doubtless in Kotzebue Sound and elsewhere in the Arctic regions. The grayling or blanket-fish concludes the list of *Coregonidae*. Of this Mr. Dall has written as follows:

"Abundant in the small rapid rivers of Alaska. It is the only fish in the Yukon territory which will take the hook. It is of moderate value only for table use, and is especially abundant in spring when the whitefish begin to be scarce."

The greatest fish wealth of Alaska lies in its abundance of fine salmon, so far at least as shore-fishing is concerned. There are five species of *Oncorhynchus*: *chouicha*, *keta*, *nerka*, *kisutch*, and *gorbuscha*—all readily distinguished one from the other by well-marked characters, except the first two. Three of them may be at once recognized by a single character even; *gorbuscha*, for example, has much smaller scales than any other species; *kisutch* has a much smaller number of pyloric cæca than all the rest; *nerka* has much the largest number of gill-rakers; *chouicha* is the giant of the group, and may well be called the "king salmon." This is the largest and finest of the Alaska salmon, reaching a weight of sixty to ninety pounds. Those weighing eighty pounds are not uncommon, and others weighing a hundred-weight have occasionally been taken. This fish, or a fish called by the same name, ranges from Sitka to Bering Strait, and is found in all water-courses from the tide-ways of the Alexander Archipelago to the broad current of the Yukon. It ascends the latter river for at least twelve hundred miles and perhaps farther. It is a short and broad fish, with a large head, but comparatively small mouth and fins. It reaches

¹ DALL, *loc. cit.*

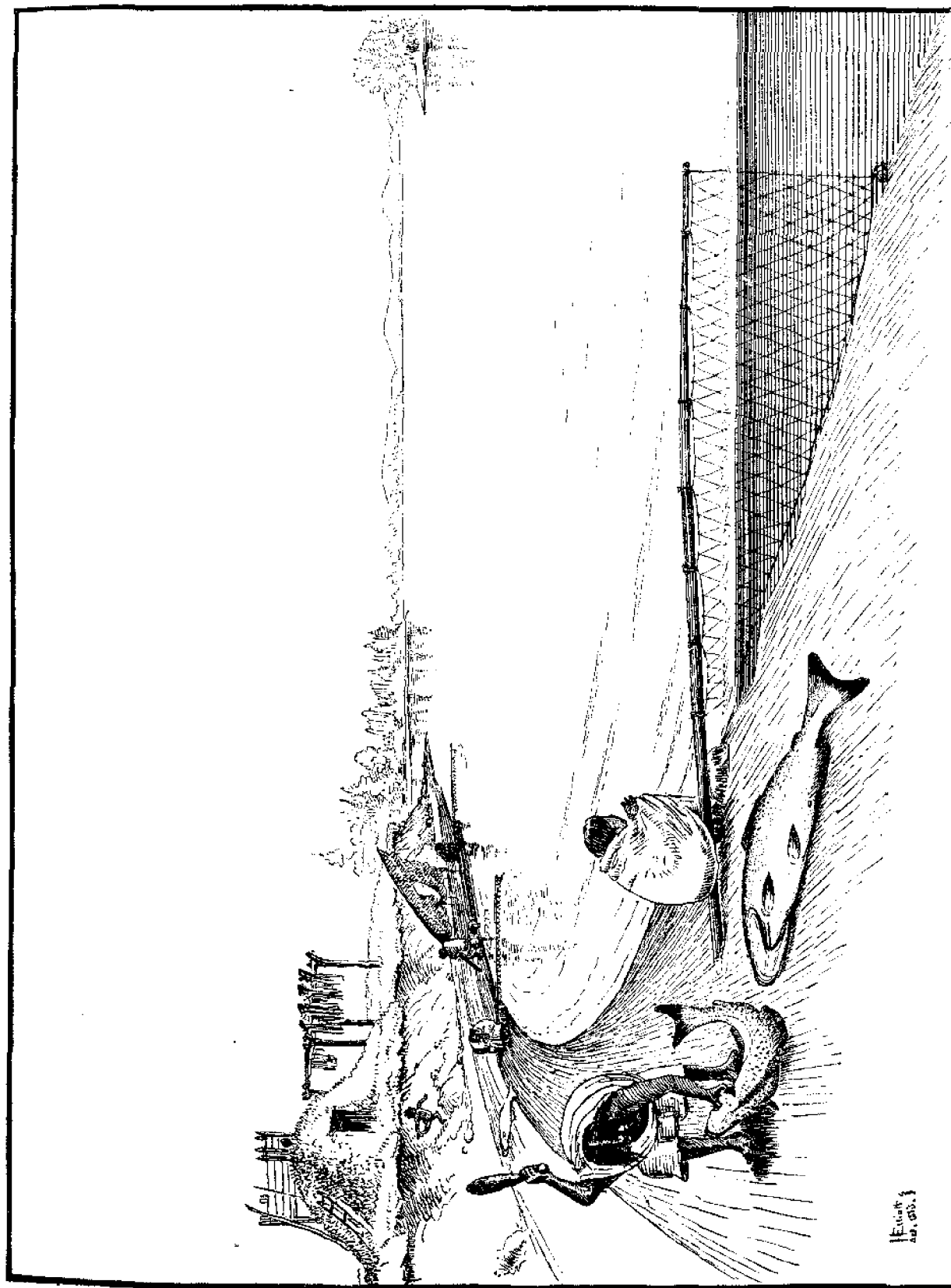
the mouth of the Yukon about the middle of June, and runs for six weeks. It ascends the river slowly, reaching Fort Derabin (about three hundred and sixty miles above the mouth of the river) about the first week in July, and Fort Yukon (about one thousand miles above the mouth) about the middle of July. It is dried for winter use by the natives. All dry fish is called *ukali* by the Russians. The chowichee *ukali* are made by cutting the fish in three slices after removing the head, leaving the backbone in the middle slice, and all three connected by the tail. Two or three dry chowichee *ukali* will weigh at least fifty pounds. One of them is accounted sufficient for a day's food for six men or dogs. They cost, from the natives upon the Yukon, one leaf of tobacco each, or, when dry, five to eight musket-balls per *ukali*. The more northern the ground where the fish are taken, the finer their flavor, and the chowichee of the Yukon were held in such esteem that several hogsheds were annually salted for the emperor's table by the Russians.¹

It is now believed that the famed "chowichee" and the "quinnat" salmon known to fish-culturists and anglers are one and the same species. The maximum size of this "king salmon" is so great as to be almost incredible, and yet there is no doubt that individuals weighing one hundred pounds have sometimes been taken. Mr. E. G. McIntyre, at Saint Paul, Kodiak, had one that was smoked by Capt. James Wilson at Fort Kenai in 1879, which weighed sixty-six pounds in its cured state; this must have weighed fully ninety pounds in the fresh condition. Capt. H. R. Bowen states that he brought one down from Kassilov that weighed eighty-four pounds after smoking, with head, fins, entrails, and half of the backbone removed. Mr. Thomas Devine told me that a silver salmon five feet long was brought to Pirate Cove, Shumagins, in 1877; this must have been *O. chowichea*. Rufus Bordukofsky claims that he has seen a chowichee salmon seven feet long at Iliuliuk, Unalashka. This seems a little too long, but I mention it as an additional confirmation of the enormous proportions reached by the species. I have been informed by Capt. E. P. Herendeen and Capt. H. R. Bowen, both of whom have caught the "king salmon," that they do not run in schools, but two or three together, keeping very close to the banks, perhaps to escape from the beluga. Of *kisutch* and *keta* (*hoikoh*) Mr. Dall says:

"These two species have the same range as the king salmon, and are dried for food in the same way. They are, however, much more common, much smaller, and are held in less esteem. They form the bulk of the better class of salmon in all the rivers of Alaska. They arrive later than the king salmon, remain longer, and travel more rapidly. They reach Fort Derabin upon the Yukon about the tenth of July, and Fort Yukon early in August. They weigh from ten to thirty pounds, and dry, after cleaning and removing the backbone, to about two or three pounds. They are more slender than the king salmon, and the males are furnished in the breeding season with a formidable array of recurved teeth, so that the natives are accustomed to knock them on the head with a club before attempting to remove them from the nets."

I noticed that the Aleuts almost invariably broke the skull of salmon, which they carried in bidarkas, near its junction with the vertebræ; this was done to kill them quickly and prevent their struggling after being stowed away. The "redfish" (*O. nerka*) and the "dog fish" (*O. gorbuscha*), Mr. Dall observes, "are principally valued for use as dog-feed. They are placed in the order of their quality as articles of food. . . . They are . . . exceedingly common, of small size, and appear later than the previously mentioned varieties. The redfish, as its name denotes, is partly of the most brilliant scarlet, but its flesh is not so red as that of the king salmon or the *hoikoh* (*O. keta*). They arrive in July and disappear late in August." This estimate of the redfish agrees perfectly with the opinion of Captain Bowen, who thinks it is the

¹ DALL, in Report of Commissioner of Agriculture for 1870, pp. 382 and 383.



Eskimo squaws gill-net fishing for salmon. Yukon and Kaskokvum Rivers.
Drawing by H. W. Elliott.

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poorest salmon salted, though it sells best on account of its red color. For my own part I think the fresh *gorbuscha* equal to any other salmon, but I prefer the chowichee bellies among the salt fish. There is nothing on the west coast which exactly corresponds with the Maine salmon. *Salmo Gairdnerii* is most like it in general appearance, and sometimes approaches it in size, but its habits are different, since it is found filled with ripe ova in June. We have this species from Sitka and Kodiak. It is very difficult to distinguish Gairdner's trout from the "rainbow trout" (*S. irideus*), so well known in the McCloud River, the characters which are supposed to separate them being unimportant. I found at Sitka one young trout which may be called *irideus* or *Gairdnerii* indifferently, and it will puzzle any one to tell which it really is. Clark's trout (*Salmo purpuratus*) is very abundant in Southern Alaska, and must be rare to the northward. Dall says that it is not found north of Alaska Peninsula. Captain Hooper had it from Northern Alaska, but the exact locality is not stated. This beautiful species is not known to reach the great size in Alaska that is claimed for occasional individuals in the Columbia River, but it is very abundant and an excellent food-fish. We found it feeding on sticklebacks (*Gasterosteus microcephalus*, Girard) in Piseco Lake at Sitka. The species known in California as the "Dolly Varden" trout is everywhere present in Alaska, reaching as much as fifteen pounds in weight, and literally swarming in the streams and adjacent tidal waters. The young of this trout were found as far north as Cape Lisburne, and the species is very abundant in Northeastern Siberia. While it remains in the streams it is generally dark colored, but after a sojourn in the sea upon re-entering the brooks and rivers it quickly shows its beautiful red spots. We found that individuals taken from the salt water showed no trace of red spots, but immediately assumed them upon being immersed in spring water. This difference of color, varying with the place of residence, has led to the supposition that they represent two species, the large silvery ones in the coves and bays being called salmon trout while the smaller inland form is known as brook trout. There is good evidence of the occurrence of one species of *Oncorhynchus* (*O. gorbuscha*), the little humpback salmon, in Colville River. Captain Hooper reports that "the salmon is the only variety of fish in the Arctic that is of any value. Although smaller than the salmon caught farther south, they are of fine flavor. They are quite plentiful, and the coast natives cure large quantities of them by smoking and drying for winter use." Capt. E. E. Smith, who was the Corwin's ice pilot on her cruise of 1880, in 1875 put up in salt two barrels of little *gorbuscha* which he bought at the mouth of Colville River.

The sole representative of the herring family of much importance as a source of food is the *Clupea mirabilis* of Girard, the common sea-herring of the Pacific coast. Widely distributed and extremely abundant, invaluable as bait and delicious on account of its fatness, it deserves a high rank among the staples of Alaskan waters. There are no finer herring anywhere than may be seined at Iliuliuk and sometimes near Saint Paul. They are as plentiful as menhaden once were in Peconic Bay, so plentiful that a lazy Indian with a stick armed with pointed nails can soon impale a canoe load; vessels have sailed for hours through shoals of them which seemed unending; acres of grass are sometimes covered with their eggs when a high tide takes them far ashore and the receding waters suddenly leave them aground. Natives are very prompt to profit by such accidents. When we came into Chugachik Bay, in Cook's Inlet, we found a sand spit strewn with recently stranded herring and their wasted eggs, while here and there were groups of poles selected from driftwood on which the fish had been hung up to dry after being split and having the head of one passed through the gills and mouth of another. The spawn clinging to blades of grass after a little sun-drying had a rather pleasant, slightly salt taste.

¹ Report of cruise of Corwin, November 1, 1880 (1881), p. 68.

The snaker family (*Catostomidae*) has but a single species so far as known, and that is apparently identical with the long-nosed sucker of the Great Lakes and the Upper Mississippi. This fish is abundant in the Yukon and other large rivers in Northern Alaska. It is of moderately large size, reaching five pounds in weight. It is generally of a reddish color. The body is so full of bones that it is unfit for food, but the heads, when boiled with the roe, make a very palatable soup. These fish are filled with spawn in April, a period when other fish appear to be out of season.¹

There is one lamprey known to us from Alaska, the *Ammocetes aureus* of Bean. This one is extremely abundant in the Yukon, according to Mr. L. M. Turner, and is used for food. Mr. Turner's specimen was taken at Anvik (latitude 63 north, longitude 160 west from Greenwich).

16. A REVIEW OF THE ALASKAN FISHING-GROUNDS BY DISTRICTS.

I have been thus explicit in naming the food-fishes of the Territory and tracing their distribution, in order that their importance as a means of subsistence for the inhabitants may be fully appreciated. All parts of the coast of Alaska are abundantly supplied with fish, and every male native of suitable age is to be considered a fisherman—one who employs the best expedients within his reach for the capture of fish, because his very life depends in great measure on that supply. Even the women and children help to increase the store for winter, tugging away bravely at great strings of salmon or other species caught in the seines by the men. Whenever there is any pulling of this kind to do, you may see them skirting along the shore, half floating the burden near the water's edge. The total number of fishermen estimated for Alaska in Census Bulletin No. 176 is fifty-six hundred and fifty, which is certainly not too high. According to Petroff's preliminary report on the population of that Territory, there are about thirty thousand inhabitants, distributed as will be seen in the following table:

POPULATION OF ALASKA.

[From Petroff.]

Southeastern Alaska.....	5,517
Estimate of Prince William Sound.....	500
Kenai Mission or Cook's Inlet district.....	984
Interior division.....	2,226
Kodiak Parish.....	2,606
Belkofsky Parish.....	669
Unalaska Parish.....	1,392
Bristol Bay division.....	4,340
Pribilof Islands.....	390
Saint Lawrence Island (estimated).....	400
Nunivak Island (estimated).....	500
Kuskokwim division.....	3,654
Yukon delta.....	2,006
Upoon mouth to Anvik.....	1,345
Coast of Norton Sound from Saint Michael's upward and as far as Sledge Island.....	633
King's Island to Point Barrow.....	2,990
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	30,152

¹DALL, in Report of Commissioner of Agriculture for 1870, p. 388.

Leaving out the interior division, and supposing that one-fifth of the whole population are adult male fishermen, we shall have about the number estimated in the Census Bulletin. Bearing in mind the great abundance of fish everywhere, and the wasteful habits of a people who neither profit by the hint of prosperity nor take warning from the kick of adversity, we may form some idea of the millions upon millions of fish annually taken in Alaska. There are not fewer than twenty-eight thousand people in the Territory who live largely upon fish, fresh during half of the year or less, and in the form of *ukali* during the balance of the year. In the absence of records to show the amounts actually put up for winter use, we must depend upon estimates. Mr. William J. Fisher, of Saint Paul, Kodiak, has very carefully inquired into the matter, taking counsel with parties who are in the business of preparing *ukali* for consumption, and observing the quantities put up by natives for their own use. Mr. Fisher has given us the following result of his investigation:

"The annual supply of dried salmon (*ukali*) put up by a native family, consisting of two adults and two children, is estimated at fifteen hundred fish, averaging about five pounds each before being dried, and, when cured, averaging about one-half pound each. The Creoles (native whites), in addition to the above, put up about six barrels of salt fish for winter consumption. These stores are not touched until the beginning of November, when, owing to inclemency of the weather, the catching of fresh fish has to be suspended. By the first of May, when the weather permits fishing again, these stores are generally exhausted. The dried fish or *ukali* is used to a great extent in lieu of bread. In addition to the above supplies, each family adds about one-half barrel of salmon spawn, more or less, to their winter stores."

I take this estimate of the quantity of fish consumed on the island of Kodiak as the basis of a calculation for the whole Territory, because the supply, as shown on previous pages of this account, is ample on all portions of the coast; Mr. Fisher's statement, moreover, agrees with all the information we have concerning the region. On the above basis each one of the population will consume at least seven hundred and fifty fish annually, the supply of *ukali* lasting only six months and being replaced by fresh fish during the rest of the year. At the low average weight of five pounds we have the equivalent of thirty-seven hundred and fifty pounds of fresh fish per year for each person, and twenty-eight thousand people at the same rate will eat one hundred and five million pounds of fish. The first cost of fish is about one-half cent per pound, so that the yearly supply of the Territory represents five hundred and twenty-five thousand dollars.

We will now consider the different divisions adopted by Mr. Petroff, giving an account of the number of fishermen, the kinds of fish, and the modes of capture and preservation.

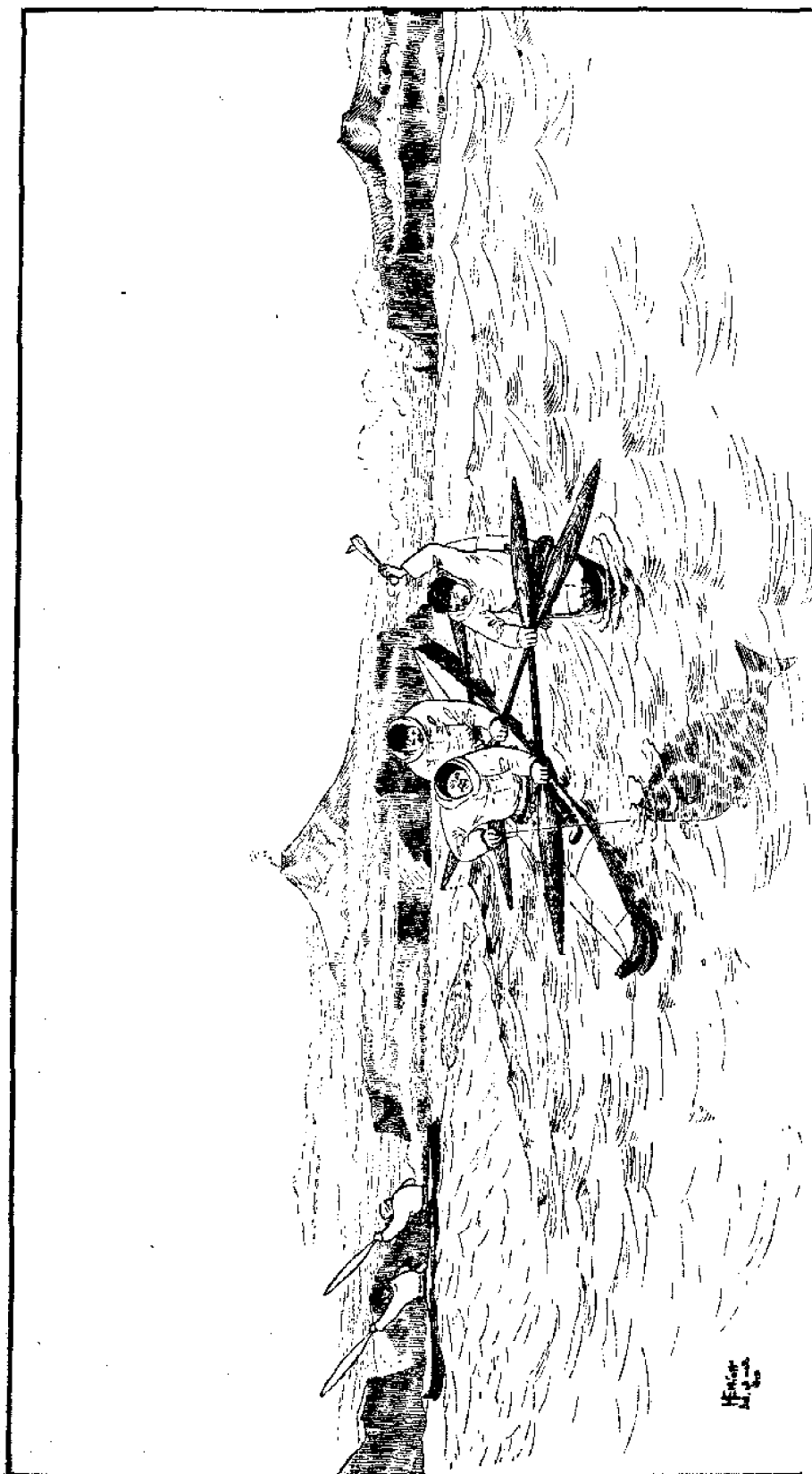
SOUTHEASTERN ALASKA.

There are at least as many as eleven hundred adult Indian fishermen in this division, who devote themselves wholly or in large part to the business of fishing for a livelihood while the season lasts. Our own observations began at Sitka, continuing there from May 28 to June 16, 1880. During this time the fishes most frequently seen in canoes and offered for sale were the halibut, several species of rock-fish, sea trout or bass, cultus cod, common cod, Gairdner's trout, red-spotted trout, Clark's trout, "hoikoh" salmon, and "keezich" salmon. In hook-fishing, which is the common method, sand lance and herring are generally used for bait. At Sitka abalones are abundant and are eaten raw by Indians. Some Chinamen, belonging to the "Jamestown," were drying large quantities of them for export to China. Delicious clams (a species of *Saxidomus*) are extremely plentiful, and form an important part of the Indian diet. The Indian village at Sitka for our purposes may be taken as the type of such villages throughout the region under

discussion. The solid log-houses here are built convenient to the water's edge. Between the houses and the water may be seen the dug-out canoes and the fish-drying frames; here and there are hung the bark fishing-lines for halibut furnished with their clumsy but effective hooks. Some very good illustrations of the Sitka halibut hooks, furnished by Commander Beardslee, U. S. N., appear in *Forest and Stream*, of 1879. The hook consists essentially of two pieces of wood fastened together at one end with strips of spruce roots so as to form an acute angle with each other, the longer arm of the angle being armed with a bent, pointed piece of iron; the wood is generally carved so as to represent some animal whose co-operation thus secured will insure successful fishing. The bait (usually herring) is tied on so as to cover not only the hook but also the wooden shaft in which the hook is fastened; halibut will gulp down the bait as long as it lasts, opening their jaws wider and wider; the short arm of the hook, being so fixed as to leave only a narrow space between it and the iron point, will admit of the motion necessary to fasten the fish, but prevents its escape. A halibut thus held with its mouth wide open will soon be drowned, and can easily be taken into a canoe. This Indian style of halibut hook is much more effective than the common halibut hook of civilization. A very common method of fishing for halibut at Sitka is by the use of set-lines, each provided with one hook, a stone sinker, an inflated stomach of seal for a buoy, with a small flag or signal attached to it so as to show when a fish is hooked. It is usual to see these lines set in ten to twenty fathoms of water off the numerous inlets of Sitka Bay. Salmon are caught by trolling with herring bait, by seining, and by spearing. Edgecumbe trout (Ah-shut of the Sitkas), *Salmo Gairdnerii* Rich., were taken by the spear on their way out (?) from Lake Edgecumbe to the sea in June. Herring are caught in great quantities by impaling them on pointed nails fastened into a long, thin strip of wood. The process of collecting herring eggs, by receiving them on spruce boughs, is too well known to need description here. The prevailing fish on the drying-frames at Sitka was halibut. This was cut in strips and dried partly in the open air and partly by smoking in the dwelling-houses. The fire is made in the center of the space inclosed by the walls, there being no floor covering this portion, and the smoke escapes through a wide opening in the roof. A frame of poles supports the strips of fish to be smoked. Very little fire and a great deal of smoke are the requirements. Besides fish, it is common to see viscera and other portions of porpoises hanging on the poles. The price of fresh fish at Sitka is usually about one-half cent per pound. Halibut ranged from twenty to seventy-five pounds in weight during our stay; we were told, however, by Mr. Whitford, that he has seen two caught in the harbor, one weighing two hundred and fifty-six and the other two hundred and sixty pounds.

I am indebted to Mr. George Hamilton, of Chacon, for the following information about halibut at Klawack:

Their average size is about fifty pounds; they are not brought in plentifully from November to March, but they are abundant during the rest of the year; Indians do not fish for them much in the winter; they are caught with the Sitka style of hook with kelp or bark lines, or sometimes eastern cod and halibut lines. Squid bait (*Octopus*) is preferred. The fishing is done in from ten to twenty fathoms of water. For the cannery, Indians go off in the afternoon and bring in the fish on the following morning. They will average eight or ten halibut to a canoe, having in it two persons who use not more than three or four hooks. The price at Klawack in 1878 was one-half cent per pound, which, unnecessarily and through mistake, was increased in 1879 to one and one-half cents. The amount canned in 1878 was two hundred or three hundred cases in two-pound cans, there being two dozen cans in a case. These were shipped to Sisson, Wallace & Co., San Francisco. Mr. Hamilton has seen more halibut in the vicinity of Warren Island than



Volcano of Akootan.

Aleuts catching halibut at the mouth of Akootan Pass, Bering Sea, Alaska.

Drawing by H. W. Elliott.

Kahlachia Point, entrance to
Ognalaska Harbor.

anywhere else. He saw fifteen Indians fishing there, and between one hundred and one hundred and fifty halibut of small size lying on the beach. The women were splitting them to dry.

In this region of Southeastern Alaska are two salmon-canning establishments—one at Klawack, and the other at Old Sitka or Turner's Point. In 1879 the Klawack cannery was said to have employed one hundred and sixty Indians and twenty whites. Of the Indians, thirty were women, five or six boys of eight to twelve years, and the rest men. In 1878 the wages for Indian men were one dollar, and for woman fifty cents per day. In 1879 the men received one dollar and twenty-five cents and the women seventy-five cents per day, although it is claimed there was no need of increasing the pay. The wages of the white men ranged from twenty dollars to fifty dollars per month. The season lasts about two months here. I suppose the capacity of the cannery is about the same as of the Old Sitka one, but there are no returns to refer to. The Old Sitka establishment is situated near the mouth of Sitka River; it was not in operation in 1880, but in 1879 it shipped seven thousand cases, of four dozen one-pound cans each, to the Cutting Packing Company of San Francisco. The boxes in which these cans are shipped are sent in shooks from Portland. The cans are made on the spot in a separate building. The high price for tin and solder was given as a reason for the inactivity of 1880. The salmon are seined by Indians, the seines being purchased by them from the cannery owners. The processes employed at Klawack and Turner's Point are essentially the same as in the Columbia River canneries. The Old Sitka establishment, either in 1878 or 1879, put up two hundred cases of halibut, each containing four dozen one-pound cans.

The eulachon, which we have from the Stikene River, Wrangell, Sitka, and Chilkat River, is caught in the same way and used for the same purposes, as described by Mr. Swan in his paper, in the Proceedings of the United States National Museum, vol. 3. The once famous Deep Lake salmon fishery at the Redoubt on Baranoff Island, which in 1868 secured two thousand barrels, is now reaping the results of overfishing. A description of the fishery by Mr. Dall is given in the Report of the Commissioner of Agriculture for 1870, page 385.

This account may be closed with the following list of the principal food-fishes of Southeastern Alaska:

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| 1. <i>Pleuronectes stellatus</i> . | 18. <i>Ophiodon elongatus</i> . |
| 2. <i>Lepidopsetta bilineata</i> . | 19. <i>Anoplopoma fimbria</i> . |
| 3. <i>Limanda aspera</i> . | 20. <i>Bathymaster signatus</i> . |
| 4. <i>Hippoglossoides elassodon</i> . | 21. <i>Ammodytes personatus</i> . |
| 5. <i>Hippoglossus vulgaris</i> . | 22. " <i>alascanus</i> . |
| 6. <i>Pollachius chalcogrammus</i> . | 23. <i>Mallotus villosus</i> . |
| 7. <i>Gadus morrhua</i> . | 24. <i>Hypomesus pretiosus</i> . |
| 8. <i>Microgadus proximus</i> . | 25. <i>Thaleichthys pacificus</i> . |
| 9. <i>Hemilepidotus trachurus</i> . | 26. <i>Salvelinus malma</i> . |
| 10. <i>Hemilepidotus Jordanii</i> . | 27. <i>Salmo purpuratus</i> . |
| 11. <i>Sebastichthys maliger</i> . | 28. " <i>Gairdnerii</i> . |
| 12. " <i>caurinus</i> . | 29. " <i>irideus</i> (probably). |
| 13. " <i>ruber</i> . | 30. <i>Oncorhynchus chouicha</i> . |
| 14. " <i>melanops</i> . ("Black bass," Sitka.) | 31. " <i>keta</i> . |
| 15. <i>Hexagrammus asper</i> . | 32. " <i>nerka</i> . |
| 16. " <i>supercilius</i> . | 33. " <i>kisutch</i> . |
| 17. " <i>decagrammus</i> . | 34. " <i>gorbuscha</i> . |
| | 35. <i>Clupea mirabilis</i> . |

PRINCE WILLIAM SOUND DIVISION.

According to Mr. Petroff's estimate, there are five hundred Indians in this division, and among them, if we continue our usual proportion, there are about one hundred adult male fishermen. We have no information about the fishes or the methods of fishing, but it is safe to say that the region closely resembles the preceding one just described. They certainly have flat-fishes, flounders, halibut, cod, tom-cod, sculpins, lancee, herring, and all the species of salmon, and doubtless many more; hair seal, too, are sure to be found just as they are in the inlet.

KENAI OR COOK'S INLET DISTRICT.

The number of adult male fishermen in this division is near two hundred in a total population of nine hundred and eighty-four. The most important fishes, as will be seen from the accompanying list, are halibut, cod, scaled sculpins, lancee, capelin, eulachon, trout, salmon, and herring. The native methods of capture are essentially like those of Southeastern Alaska. This region is the field of two salmon fisheries operated by Capt. James Wilson, for the Alaska Commercial Company, and by Capt. H. R. Bowen, for the Western Fur and Trading Company. Mr. William J. Fisher, United States Coast Survey tidal observer at Saint Paul, Kodiak, has kindly obtained from these gentlemen most of the information we possess about those fisheries. Writing of the "king salmon," Mr. Fisher says:

"The Indians living near these two rivers catch only very small numbers of the fish, partly owing to their very imperfect implements used for the purpose. The fish being too large they cannot use their spears effectually. Their usual and most efficient mode of capture is as follows: A stage is erected in the river which an Indian mounts, holding a large wicker basket with an aperture of about five feet square, in the river, patiently waiting, sometimes for weary hours, before a salmon is so foolish as to enter the basket, while many hundred will go past, over, or under the basket, ignoring the invitation to enter. The natives smoke and dry their catch, and when they do sell any they charge at the rate of ten cents per fish."

Mr. Fisher gives the following notes on the "chowichee" or "king salmon" (*O. chowicha*):

"They are found in the inlet from May 20 to August 20, being more abundant during small tides; they are only one-fifth as plentiful as the silver salmon (*O. kisutch*), and one-third as abundant as red salmon (*O. nerka*); they reach a maximum length of six feet and a weight of forty pounds; they appear regularly on the 20th of May, running in pairs and not in schools, following the shore closely to avoid the beluga; they refuse to take the hook at all times; they prey upon eulachon and sticklebacks, not consuming very much; they are caught by the whites in weirs and nets; the nets are (of) eight and one-half inch mesh, twelve feet deep, and one hundred and twenty feet long, and are used during the entire season; the average daily catch is about one hundred fish; they are caught more plentifully from (the) first (of the ebb) to half-ebb tide; the natives dry them for winter use, while the whites salt them for shipment to San Francisco; small quantities are smoked; about three hundred barrels were salted in the season of 1880; one vessel, employing from five to eight men, is engaged in the fishery."

"The run of salmon in 1880 at Kenai was very light until July 20. Prior to that date the fish were running largely at Tyonik, about seventy miles up Cook's Inlet from Kenai, and also up the Sutchitna (Sushetno) River at the head of the inlet. These fish have seldom been known to go up the latter river during past years, and then only in very small numbers. The Sutchitna (Sushetno) River Indians, who, owing to scarcity of fish heretofore in their river, always bought their winter supply of smoked and dried fish from the natives of Tyonik, caught such an abundant supply in 1880 as to enable them to sell to their former purveyors."

On the 4th of July, 1880, we saw two species of salmon—"redfish" or "*krasnoi riba*" (*O. nerka*) and "*hoikoh*" (*O. keta*)—hanging on the drying-frames at Alexandrovsk in great numbers. A lagoon near the village, which receives a small but rapid stream, is well supplied with fish. In addition to the ordinary frame of poles on which the split and gashed salmon are hung, the natives frequently fasten small trees in the ground, cut off the limbs to a suitable length, and cover them with the blood-red fruits of their labors, making them a kind of Christmas tree of substantial. The little houses in which dried fish are stored for winter are set on logs placed endwise to insure protection from dogs. Cod and halibut are reported to be present here the year round. The halibut-line of these people is made of the stem of bull kelp, which grows here to an immense size. One of the plants measured aboard the "*Yukon*" had a stem sixty-seven and one-half feet long, with eighty-six fronds, two of which measured twenty-five and thirty-five feet, respectively. On this kelp line two hooks are fastened at the ends of a short bar on short snoods. The stone sinker is fastened to the middle of the bar by a snood longer than those holding the hooks. The bidarkas are made of the skins of hair seal. At the time of our visit seven skins of sea-otter recently killed were stretched on drying frames. The sea-otter are said to feed largely on chitons and clams. The abundance of fine clams near Alexandrovsk makes it a good otter-ground. From Alexandrovsk due northward is a settlement called Seldovia, consisting of sixty-eight Kodiak natives and creoles, who are devoted to sea-otter hunting. On the opposite side of Chugachik Gulf, near Anchor Point, is the village of Laida, containing seventy-eight Kenai people, who are also sea-otter hunters with indifferent success. Mr. Petroff gives a graphic account of the Kenai people, from which I extract the following remarks relating to the fishing:

"These people build birch-bark canoes with which to navigate the numerous swift and brawling rivers in their Territory, and they go down to the seaboard, buy skin canoes of the Kodiak pattern, and navigate to some extent on salt water, in quest of fish, in this manner. In this connection we wish to call attention to the fact that these people do not make, in any form whatever, wooden canoes; for that matter the explorer will find no wooden canoes north of Mount Saint Elias in this whole region. They are expert fishermen, and they certainly enjoy an abundance of piscatorial food, salmon of fine size and quality running up their rivers, trout in the thousand and one lakes of their country, finding them there all through the winter, fishing through the ice; and with a certain degree of contempt for the salt water, which is the treasure-trove and life-trust of the Kodiaker and the Aleutian, they spend no time there unless the steamboat-puffing of an approaching school of white whales attracts their cupidity and supplies them with a rare feast. These animals (the '*beluga*') are found here running up some of their rivers quite a distance."

THE KASSILOV SALMON FISHERY.

The Kassilov fishery, owned by the Western Fur and Trading Company of San Francisco, and operated by Capt. H. R. Bowen, is located at the mouth of Kassilov River, Cook's Inlet. It was established in 1879. The gill-nets are twenty-four fathoms long, two fathoms deep, with a mesh of eight and one half inches, and cost ten dollars each. They are made of Barber's shoe-thread. Gill-nets are used for salmon also. Two buildings, valued at two hundred and fifty dollars, are in use. There are three sixteen-foot dories. Four natives of Alaska are employed. The fishery is active from May 20 to September 1. Tide water makes up the river about seven miles; there are no obstructions except rapids. Two weirs are constructed here; the leaders are

¹Preliminary Report on Census of Alaska, 1881, p. 36.

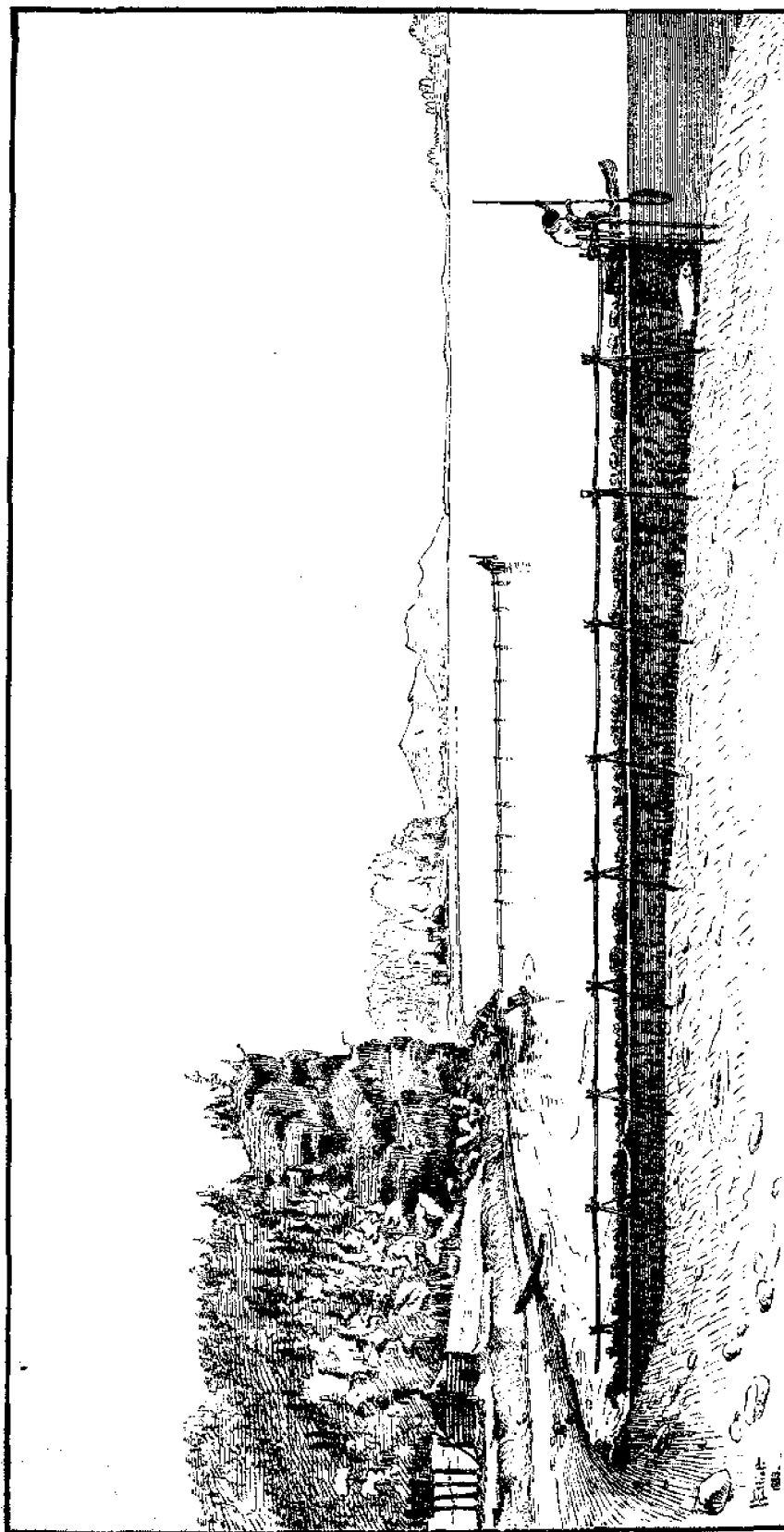
seventy-five feet long; the weirs or hearts are fifteen feet square, and are made of stakes and brush; they are kept down four months, beginning in June; "king" (*O. chowicha*), "silver" (*O. kisutch*), and "red salmon" (*O. nerka*) are taken in them. Captain Bowen says he is putting up the "king salmon" in full barrels with Liverpool salt. The first lot sent down brought ten dollars per barrel; the second lot, seven dollars. The flesh is very red when they first come; after they have been some time in the river the skin becomes red and the flesh light-colored. The "redfish" or "red salmon" sell for seven dollars in two half barrels or six dollars in full barrels. The "silver salmon" accompanies the red, is larger and every way superior, but is not nearly so plentiful. Captain Bowen put up fifty barrels of them last fall (1879) and says he could easily salt eight hundred barrels. These fish are sent to San Francisco by two schooners in August and October. Captain Bowen salts salmon bellies, also, in small packages. Bellies are worth twelve dollars by the barrel. Barrels, half-barrels, quarters, and kits are sent in shoeks from San Francisco. They are made of Portland spruce. The half-barrel complete costs one dollar and seven cents, the barrel one dollar and thirty nine cents for the stock alone. Barrel hoops cost twenty-four dollars per thousand.

Products of the Kassilov Salmon fishery, 1880.

Months.	Kind of salmon.	Barrels.	Number of fish.	Weight in pounds.
July.....	Chowichoe bellies.....	160	8,000	320,000
August.....	Silver salmon.....	185	18,500	185,000

KENAI SALMON FISHERY.

The Alaska Commercial Company has established on Kenai River a fishery, which is managed by Capt. James Wilson, one of the company's traders. For the information concerning this fishery I am indebted to Mr. B. G. McIntyre, an agent of the Alaska Commercial Company. Salmon were first salted by this company in 1878, and bellies were first salted by them in 1879. The "Saint George," a trading schooner of one hundred and twenty tons, takes the barrels of salmon only incidentally, her regular business being that of a trader. Salmon in Cook's Inlet are very uncertain—some years the natives cannot get enough for their own use, and other years they are very abundant; this does not seem to depend on the severity of the winters. "King salmon" are taken in gill-nets, dip-nets, and weirs. Two weirs, similar to those in use at Kassilov, are in operation here. "Red salmon" are taken successfully only in seines. The natives here receive ten cents apiece for salmon. Only the bellies are salted; they are generally worth twelve dollars per barrel, sometimes fourteen dollars. At Kenai sixty pounds of salt are used to a barrel of fish. The fish are washed in pure spring water after they have been dressed, and then they are "struck" in the barrels in brine made of the same water. When the barrels are filled up after heading the brine added is made of spring water, but it must be brought to the boiling point and then put in after cooling. The brine does not seem to get strong enough unless it is boiled. The usual plan is to strike the fish and then repack, which takes eighty to one hundred pounds of salt. To put up a barrel of salt "king salmon" costs about three dollars and fifty cents at Kenai; one dollar for the fish, one dollar and seventy-five cents for the barrel and cooperage, forty cents for the salt, and thirty-five cents for the labor. The "red salmon" will not cost much less. Captain Wilson told Mr. McIntyre that in eleven years he has not seen a "king salmon" that weighed over one hundred pounds. The Alaska Commercial Company sells its salmon wherever a market offers. The amount salted in 1880



Stake and rider salmon weir. Constructed in the tide flats of Cook's Inlet by old Indians, and used exclusively by them. The young and able-bodied savages use gill-nets and traps.

Drawing by H. W. Elliott.

was one hundred and fifty barrels of belies. Estimating fifty fish to the barrel we shall have seventy-five hundred fish, weighing about three hundred thousand pounds; of course, only a small portion of each fish goes to form the finished product.

For the sake of completeness I mention some of the principal food-fishes of Cook's Inlet:

<i>Pleuronectes stellatus</i> , Pallas.	<i>Mallotus villosus</i> , (Muller) Cuv.
<i>Lepidopsetta bilineata</i> , (Ayres) Gill.	<i>Thaleichthys pacificus</i> , (Rich.) Girard.
<i>Hippoglossus vulgaris</i> , Fleming.	<i>Salvelinus malma</i> , (Walb.) Jor. & Gilb.
<i>Pollachius chalcogrammus</i> , (Walb.) Jor. & Gilb.	<i>Salmo purpuratus</i> , Pallas.
<i>Gadus morrhua</i> , Linnaeus.	<i>Oncorhynchus chouicha</i> , (Walb.) Jor. & Gilb.
<i>Tilesia gracilis</i> , (Tiles.) Swainson.	" <i>keta</i> , (Walb.) Gill & Jor.
<i>Hemilepidotus trachurus</i> , (Pallas) Günther.	" <i>nerka</i> , (Walb.) Gill & Jor.
" <i>Jordanii</i> , Bean.	" <i>kisutch</i> , (Walb.) Jor. & Gilb.
<i>Hexagrammus asper</i> , Steller.	" <i>gorbuscha</i> , (Walb.) Gill & Jor.
<i>Ammodytes personatus</i> , Girard.	<i>Clupea mirabilis</i> , Girard.

KODIAK PARISH.

The total population of this division is stated to be about twenty-six hundred. Taking our usual percentage of this we shall have two hundred and twenty fishermen, most of whom are Kodiak Innuits and Creoles. The methods and results of the fishing, particularly on the island of Kodiak, have been greatly modified by civilization. The people have a wonderful wealth of fish in the waters around them, and they have learned how to capture and preserve them to the best advantage. Boats and small vessels of ten to thirty tons replace to a great extent the *bidarka*. While we were at Saint Paul a small vessel was being built for Captain Caton. The settlement on Wood Island has a small shipyard, where vessels of twenty-five or thirty tons are built for fishing and trade, according to Petroff.¹ The village of Afognak engages also in boat-building, at which the men are expert; they have many orders, chiefly for row-boats for the fishermen. Every settlement in this parish is engaged in sea-otter hunting, many of them almost exclusively. From Mitrofanía at the southern extreme to Douglas in the north, in the waters bathing the eastern shore of the peninsula of Alaska and the islands of the Kodiak group natives pursue this valuable quarry, securing, according to Mr. Petroff's returns, nine hundred skins in 1879. This number includes the catch to the eastward to Mount Saint Elias, but falls to the share of Kodiak Parish mainly. The small settlement of Ayakhtalik, on Goose Island, gets quite a number of sea-lion skins around Sitkhiak Island. The people of Kaguiaik obtain a few sea lion skins, and the Orlovsk men secure a great many annually.

This parish is profusely supplied with cod, halibut, salmon, herring, capelin, eulachon, clams, and mussels. There are many other fishes which are abundant, but those named are the great staples. On the islands of Kodiak and Afognak alone Mr. Fisher records the following quantities prepared for home consumption:

	Salted salmon.	Salmon spawn.	Ukali.
	<i>Barrels.</i>	<i>Barrels.</i>	<i>Pounds.</i>
One hundred and sixty-five families of Creoles put up	990	82	128,750
Three hundred and thirty-four families of Aleuts put up		167	250,500
Total	990	249	377,250

¹ Preliminary Report on Census of Alaska, 1881, p. 29.

It must be kept in mind that one pound of *ukali* represents ten pounds of fresh fish. Mr. Fisher's estimates of the supplies of the settlements on Cook's Inlet and part of Alaska Peninsula is as follows:

	Salted salmon.	Salmon spawn.	Ukali.
	<i>Barrels.</i>	<i>Barrels.</i>	<i>Pounds.</i>
Thirty-four Creole families put up.....	170	17	25,500
Three hundred and ten Indian families put up.....		135	230,000
Total.....	170	172	255,500

The average retail price of fresh fish at Saint Paul is one-half cent per pound, while the average price of fresh beef is ten cents per pound, and of salt pork fifteen cents. Cooked oysters are brought up from San Francisco and sell at forty cents per can. Canned lobsters from the same city are retailed at the same price. Clams from the vicinity sell for twenty cents a pail, fresh. Small quantities of salmon are smoked by the natives. Mr. Fisher names the following shell-fish as of common occurrence: *Cardium corbis*, *Cardium LaPerousii*, *Modiola*, *Tapes staminea*, *Saxidomus Nuttallii*.

THE KARLUK RIVER SALMON FISHERIES.

Karluk River, on the west side of Kodiak Island, furnishes more salt salmon than any other Alaskan stream, about sixteen hundred barrels having been secured there during the season of 1880 by two firms. One of these fisheries is owned by the Western Fur and Trading Company of San Francisco, and is operated by Capt. H. R. Bowen, of Saint Paul, Kodiak. Mr. Fisher has obtained from Captain Bowen the following account of that fishery: It was established in 1880, at the mouth of the river, and was active during June, July, August, September, and part of October. Fish run up the river into a lake—the source of the river—about seventeen miles. Tide-water extends up the stream about four miles. The only obstructions are rapids. All the species of *Oncorhynchus* now recognized run into the river; they are known by the Russian names "krasnoi riba," "keezitch," "chowichee," "gorbuscha," and "hoikoh." The trout or "sumgal" (*Salvelinus malma*) also occurs here abundantly.

Salmon are caught at this fishery by seines, in the handling of which dories are used. The natives use their spears as well as seines; instead of dories they use bidarkas. There are about three hundred natives at the Karluk settlement, nearly all of whom are Kodiak Inuit. It is stated by Captain Bowen that these three hundred caught and dried at least one hundred thousand salmon (averaging one-half pound each in the dried state) during the summer.

The seines here are twenty-five fathoms long, three fathoms deep, with a mesh of three and one-fourth inches; they cost thirty-dollars each. Four dories, sixteen feet long, are in use. The fishery employs twenty men, five of whom are Norwegians and fifteen natives of Alaska. The product of the fishery is as follows:

	Number of fish.	Estimated weight, pounds.	Barrels.
<i>O. nerka.</i>			
June 16.....	750	7,500	16
June 17.....	3,000	30,000	60
June 18.....	2,000	20,000	40
June 19.....	3,000	30,000	60
June 20.....	3,000	30,000	60
June 21.....	1,500	15,000	30
Month of July.....	12,000	120,000	240
Month of August.....	7,500	75,000	150
<i>O. keta and gorbuscha.</i> ¹			
August 12.....	18,500	185,000	
September 18.....	21,000	210,000	

¹ Made into ukali.

The *ukali* were made for the use of native hunting parties. As before stated, the average weight of a cured fish is one-half pound; hence the fish converted to this use resulted in nineteen thousand seven hundred and fifty pounds of *ukali*.

The schooner "O. S. Fowler" of thirty-five and forty-five one-hundredths tons, is engaged in this fishery and the Kassilov fishery for the Western Fur and Trading Company. Captain Bowen informed me that her present value is five thousand dollars, and that her outlay for the season of 1880 was five thousand dollars, which includes the cost of the buildings at Saint Paul, Kodiak, used in preparing the fish for market. The "O. S. Fowler" has three Norwegians, one Russian Creole, and one American (the captain) as its force. She brought to Saint Paul one thousand barrels of salted salmon and nineteen thousand seven hundred and fifty pounds of *ukali* from Karluk and Kassilov, during the season of 1880.

Smith & Hirsch own a fishery which is also at the mouth of Karluk River. Charles Hirsch is the superintendent. According to Mr. B. G. McIntyre, this fishery was established in 1879, during which year they put up six hundred barrels of salt salmon which brought about six dollars per barrel. This firm has in its service the twenty-nine ton schooner "Calistoga", of which Oliver Smith is master. Her present value is said to be twenty-five hundred dollars. Besides the master she carries four men, one of whom is a Swede and the other three are Russian Creoles. The average share of the crew is twenty to thirty dollars per month. Mr. McIntyre, to whom I am indebted for information about the vessel, thinks the "Calistoga" had about five thousand dollars invested in the business in 1880. Smith & Hirsch are represented as having salted nine hundred and thirty-nine barrels of salmon and dried seventeen thousand five hundred pounds of *ukali*.

Two seines are used by Smith & Hirsch, and their dimensions are: Length, fifteen and twenty-five fathoms; depth, one and one-half and two fathoms; mesh, three and one-half and four and one-half inches. The smaller one cost twenty-five dollars and the larger thirty-five dollars. A building used here for fish-salting purposes cost five hundred dollars. Six eighteen-foot dories are in use. Twenty-five men are employed—one Swede, one Irishman, and twenty-three natives.

The results of the season of 1880 were as follows:

	Number of fish.	Estimated weight in pounds.	Barrels.
<i>O. nerka.</i>			
June.....	37,500	375,000	125
August.....	19,950	199,500	399
September.....	20,750	207,500	415

The average weight of these red salmon is estimated at ten pounds. Of the thirty-seven thousand five hundred fish caught in June only the bellies were salted, making one hundred and twenty-five barrels.

In the beginning of July red salmon became scarce, and after the run of humpbacks (*O. gorbuscha*) set in (July 12), the red salmon (*O. nerka*) disappeared altogether. Smith & Hirsch stopped fishing until August 14, when the red salmon again made their appearance.

During July, August, and September, Smith & Hirsch made into *ukali* thirty-five thousand red and humpback salmon, whose estimated weight fresh was three hundred thousand pounds; the *ukali* made from them weighed about seventeen thousand five hundred pounds.

The fish put up by this firm are consigned to the Alaska Commercial Company, and sold by Lynde & Hough, of San Francisco.

Captain Bowen says that a seine adapted for use at Karluk River should be thirty fathoms long, three fathoms deep, of three-inch mesh, with five-foot poles on the wings. He has caught and

cured at Karluk one hundred and seventy-five barrels of red salmon in less than four days with ten natives at work. The natives do everything but salt the fish; this Captain Bowen does himself. Ten men could average fifty barrels a day easily if a vessel could lie there every day, but Karluk is open to the sea. With proper buildings ashore ten thousand barrels might be put up in a season. At Karluk the salmon are thicker on the flood tide, becoming thicker as the tide rises, but going off at high water. Looking down into the water, it would seem that a lead pencil could not be passed down between the densely crowded fish; a bidarka cannot be paddled over them when the salmon are thick.

Red salmon are abundant every year at Karluk. There is perhaps no better place in Alaska for the establishment of a great salmon fishery.

The following are the principal food and bait fishes of Kodiak Parish:

<i>Pleuronectes stellatus</i> , Pallas.	<i>Hexagrammus ordinatus</i> , Cope.
“ <i>quadrituberculatus</i> , Pallas.	“ <i>superciliatus</i> , (Pall.) Jor. & Gilb.
<i>Lepidopsetta bilineata</i> , (Ayres) Gilb.	“ <i>decagrammus</i> , (Pall.) Jor. & Gilb.
<i>Limanda aspera</i> , (Pall.) Bean.	<i>Pleurogrammus monopterygius</i> , (Pall.) Gill.
<i>Hippoglossoides elassodon</i> , Jor. & Gilb.	<i>Ammodytes personatus</i> , Girard.
<i>Hippoglossus vulgaris</i> , Flem.	<i>Mallotus villosus</i> , (Müller) Cav.
<i>Atheresthes stomias</i> , Jor. & Gilb.	<i>Thaleichthys pacificus</i> , (Rich.) Girard.
<i>Pollachius chalcogrammus</i> , (Pall.) Jor. & Gilb.	<i>Salvelinus malma</i> , (Walb.) Jor. & Gilb.
<i>Gadus morrhua</i> , Linn.	<i>Salmo purpuratus</i> , Pallas.
<i>Tilesia gracilis</i> , (Tiles.) Swainson.	“ <i>Gairdnerii</i> , Rich.
<i>Cottus polyacanthocephalus</i> , Pallas.	<i>Oncorhynchus chouicha</i> , (Walb.) Jor. & Gilb.
<i>Hemilepidotus trachurus</i> , (Pall.) Günther.	“ <i>keta</i> , (Walb.) Gill & Jor.
“ <i>Jordanii</i> , Bean.	“ <i>nerka</i> , (Walb.) Gill & Jor.
<i>Sebastichthys melanops</i> , (Grd.) Jor. & Gilb.	“ <i>kisutch</i> , (Walb.) Jor. & Gilb.
“ <i>ciliatus</i> , (Tiles.)	“ <i>gorbuscha</i> , (Walb.) Gill & Jor.
<i>Hexagrammus asper</i> , Steller.	<i>Clupea mirabilis</i> , Girard.

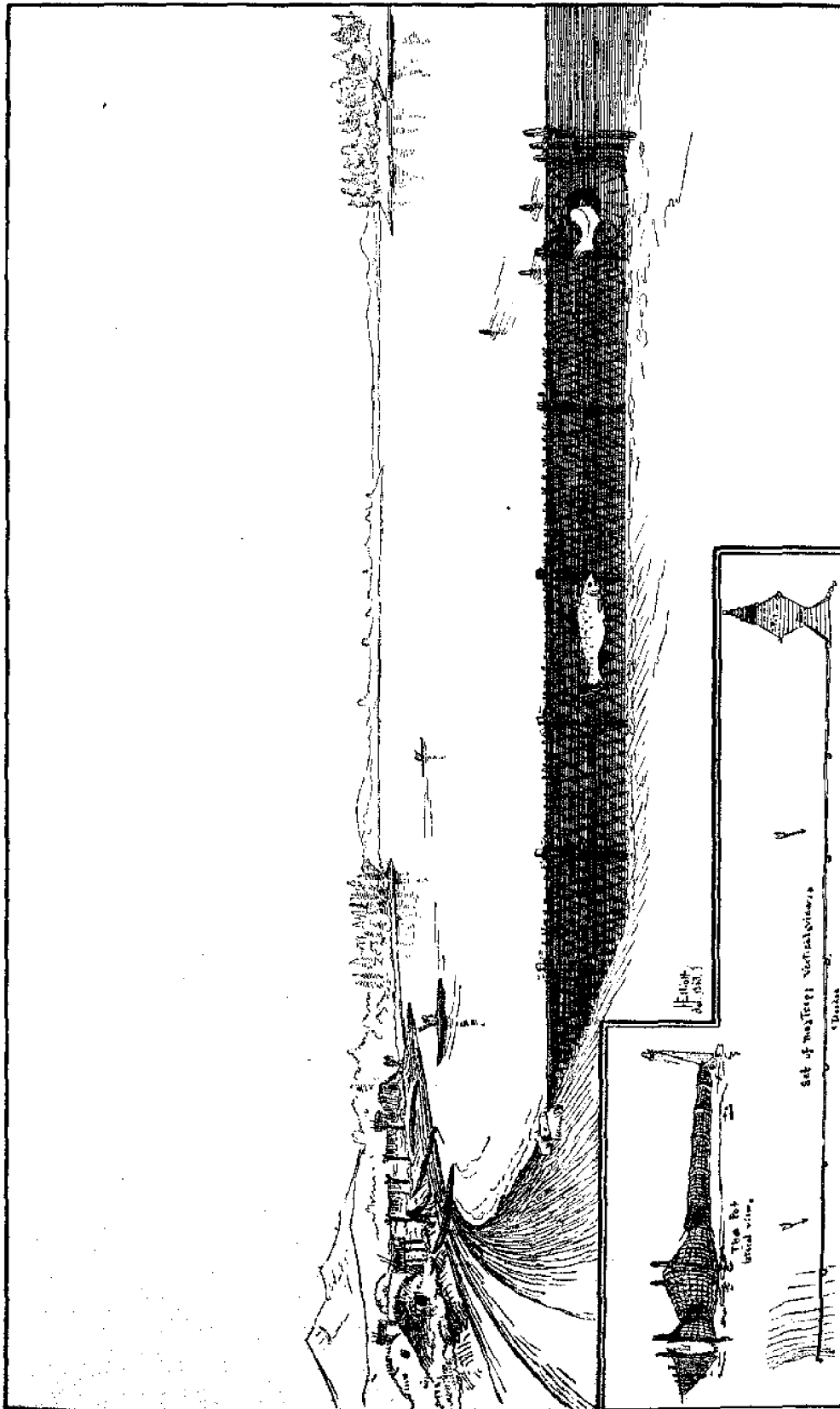
The following are the names of fishes given to us on the voyage from Alexandrovsk to Saint Paul, Kodiak, by a native of the island of Kodiak. The species were all shown to him except the *krasnoi riba*:

<i>Gadus morrhua</i>	Ah-mo-doc.
<i>Tilesia gracilis</i>	Sah-ke-lakh.
<i>Muraenoides ornatus</i>	Poo-lakh.
<i>Ammodytes personatus</i>	Ah-zhing ah-ryeerk.
<i>Hemilepidotus</i>	Kah-log.
<i>Cottus polyacanthocephalus</i>	Ki-oo-loong-chook.
<i>Gasterosteus cataphractus</i>	E-lach-en-akh.
<i>Mallotus villosus</i>	She-gakh.
<i>Salvelinus malma</i>	Ahn-chuck.
<i>Oncorhynchus gorbuscha</i> ...	Ah-mah-kee-akh.
<i>keta</i>	Ah-lay-makh.
<i>nerka</i>	Nee-kee-uk.

Names of other objects:

<i>Littorina</i>	E-book.
<i>Diomedea brachyura</i>	Kay-may-ryeerk.

EXPLANATION.—A is sounded as in father, except in the second syllable of Ah-lay-makh, and in the first two syllables of Kay-may-ryeerk. The names express as nearly as possible the sounds used by the native in conveying his identification of the objects to me.



Salmon trap in common use by the natives on the great rivers of Alaska, especially on the Yukon and Kuskokwim.

Drawing by H. W. Elliott.

THE ALASKAN FISHING-GROUNDS.

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Settlements on Kodiak and Afognak Islands.

	Creoles.				Aleuts. ¹			
	Adults.		Children.		Adults.		Children.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Saint Paul.....	77	82	55	53	5	6	1	3
Lesnoi.....	19	20	6	12	42	32	12	13
Afognak.....	68	66	36	25	40	44	36	24
Ilobia.....	20	31	14	7				
Orlova (Eagle Harbor).....	6	6	4	1	84	83	39	55
Old Harbor.....	8	7	5	3	81	65	28	22
Kagnyak.....					97	60	35	41
Iachlok.....					36	32	20	16
Karluk.....	8	7	4	5	40	59	49	39
Total.....	212	210	124	106	475	421	230	213

¹ Actual count taken from church registers.

NOTE.—The totals of Creoles are equal to one hundred and sixty-five families of four persons each; the totals of Aleuts, to three hundred and thirty-four families of four persons each.

SALMON PREPARED BY NATIVES FOR HOME USE.

	Salmon salted.	Salmon spawn.	Ukall.
	Barrels.	Barrels.	Pounds.
One hundred and sixty-five families of Creoles put up.....	990	82	126,750
Three hundred and thirty-four families of Aleuts put up.....		167	250,500
Total.....	990	249	377,250

Settlements on Cook's Inlet and Alaska Peninsula.

[Actual count taken from the church registers.]

	Creoles.				Indians.			
	Adults.		Children.		Adults.		Children.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Katmai.....	11	13	8	5	64	58	30	29
Kamishak.....					14	11	11	10
Nuchek.....					40	38	25	23
Uliamna.....					15	12	11	7
Alexandroveski.....					20	16	10	12
Soldona.....					12	10	8	8
N. Nitchik.....	15	12	7	8				
Families.								
Kassilov.....					4			
Kenni.....	19	16	12	6	20			
Kuik.....					30			
Tyonak.....					30			
Sutchitna.....					30			
N. Kishki.....					10			
Kasketan.....					10			
Kugak.....					10			
Douglas.....					20			
Total.....	34 families.				310 families.			

FISHING-GROUNDS OF NORTH AMERICA.

SALMON PREPARED BY NATIVES FOR HOME USE.

	Salmon salted.	Salmon spawn.	Ukali.
	<i>Barrels.</i>	<i>Barrels.</i>	<i>Pounds.</i>
Thirty-four families of Creoles put up for winter stores.	170	17	25,500
Three hundred and ten families of Indians.....		153	220,000
Total.....	170	172	235,500

Recapitulation of catch of fish for home consumption and export in 1880.

	Herring smoked.	Codfish.		Salmon.			Ukali.
		Salted.	Boneless.	Smoked.	Salted.	Spawn.	
	<i>Boxes.</i>	<i>Barrels.</i>	<i>Barrels.</i>	<i>Pounds.</i>	<i>Barrels.</i>	<i>Barrels.</i>	<i>Pounds.</i>
Alaska Commercial Company.....					150		
Smith & Hirsch.....					939		17,500
Western Fur and Trading Company:							
Kassilov fishery.....					345		
Karluk fishery.....					655		19,750
Saint Paul fishery.....	500		250	4,000			
Creoles, Kodiak Island.....					990	82	126,750
Alouts, Kodiak Island.....						167	250,500
Creoles, settlements, Alaska Peninsula.....					170	17	25,500
Indians, settlements, Alaska Peninsula.....						153	220,000
Total.....	500		250	4,000	3,249	421	670,000

¹ Boxes of thirty pounds each.

In addition to the above the Western Fur and Trading Company have put up experimentally:

Smoked halibut, pounds.....	500
Codfish tongues, in kits of twenty-five pounds each.....	10
Halibut fins and napes, salted, in kits of twenty-five pounds each.....	10
Frostfish, salted, in quarter barrels.....	10
Salmon-trout, salted, in quarter barrels.....	30
Codfish, dried, in one hundred pound boxes.....	30
Herring, salted, in quarter barrels.....	25
Herring, salted, in kits of twenty-five pounds each.....	100

BELKOFFSKY PARISH.

Since the fishes of this division are practically the same as those of the Shumagins, it is unnecessary to furnish a separate list of them. Mr. Petroff gives the population as six hundred and sixty-nine. The division, in fact, includes the settlements on the Shumagin group, and this group has essentially the same species as Kodiak Parish with the addition of *Trichodon stelleri* and *Bathymaster signatus*, the latter being important mainly for bait. *Bathymaster* is called "cusk" at Pirate Cove, Shumagins.

Belkoffsky Parish contains the settlements of Belkoffsky, Nikolaievsky, Protassov, Vosnessensky, Unga, and Korovinsky. The wealthiest of all is Belkoffsky, which has an abundance of fish, and takes nineteen hundred to two thousand sea-otter annually. Protassov takes five hundred sea-otter and some walrus. Unga takes about six hundred sea-otter. Vosnessensky and Korovinsky also take a few sea-otter. The natives of Korovinsky are occasionally employed at the cod-fishing stations of the Shumagins. At Belkoffsky, a fine salmon river falls into the bay. Natives take the salmon in small seines, and the women and children string them on twigs



THE ALASKAN FISHING-GROUNDS.

and pieces of cord and drag them along just at the edge of the water around the beach to their village. The fish are piled in heaps and then begins the process of cutting, splitting, and gashing, preparatory to hanging them on the drying-frames. Great heaps of heads and entrails lie all around, very attractive to flies and beetles, but rather repulsive to visitors. At the time of our visit (July 23, 1880), *O. gorbuscha* was the species taken. Mr. Frost told me that the *gorbuscha* comes first, and that it appeared in quantities two weeks prior to our arrival; the "*hoikoh*" (*O. keta*) was there and the "*krasnoi riba*" (*O. nerka*), but neither of these was plentiful; they come later. Cod are caught in the harbor. A few cod were hanging up to dry, but salmon were abundant everywhere. The natives nearly all have comfortable-looking houses, a few of which are painted blue, with red roofs.

Mr. Devine says that natives from Korovinsky come over to a cove on Popoff Island, near Pirate Cove, to fish for salmon; they generally get good silver salmon (*O. kisutch*?) there. A silver salmon five feet long was brought to Pirate Cove in 1877; from the size, I would suppose this to have been *O. chouicha*. Clams are very abundant and excellent about the Shumagins.

One of the finest known baits for cod is common in deep water about the Shumagins; it is the "yellow-fish" or striped fish (*Pleurogrammus monopterygius*), a species which is found in great schools and may be taken in the purse-seine like mackerel, which it resembles in size, and, after salting, in taste. Cod are passionately fond of this fish, and also of the "whiting" or "silver hake" of the region (*Pollachius chalcogrammus*). The Shumagin cod fishery, having already been treated at length, need not be entered upon here.

UNALASHKA PARISH.

This division, with a total population of nearly fourteen hundred, would have a fishing population of about two hundred and eighty. It includes the islands of Attu, Atka, Umnak, Unalashka, Spirkin, Akutan, Akun, and Avatanok. In this district will be observed a difference from the single paddle of the eastern shore of the Gulf of Alaska and the Kodiak group, the bidarkas here being propelled by double paddles and with quite a change of motion. The effect of the double paddle, which is grasped in the middle, is pretty, but the movement is not so steady as that resulting from the use of the single paddle. The bidarka is the universal form of boat for coasting and even for sea-going in weather that will allow its use.

Aleut names of parts of a bidarka, obtained through Mr. King.

English.	Russian.	Aleut.
Gunwale.....	Shistee.....	Un-mah-gligh.
Keel.....	Keel.....	Ah-tah-kay.
Ribs.....	Riobra.....	Keel-ghagh.
Beams.....	Beamsi.....	Ah-gah-dach.
Stringer (between hatches).....	Koo-lich.
Hatch.....	Luko.....	Oo-looch.
Stern.....	Korma.....	Tab-sach.
Lashings.....	Zaviaski.....	Eck-thoo-sahk.
Luvtak.....	Luvtak.....	Lach-tach-ach.
		Chang-jak.
Nose of prow (in three pieces).....	Nosok.....	Kut-koo-mah.
		Koo-goo-show.

A good three-holed bidarka is worth from thirty dollars to fifty dollars. The luvtaks, or skin coverings of the wooden frame-work, are made of sea-lion here.

The fishes of this division are nearly the same as those of Kodiak Parish, with the exception of the species of *Sebastichthys*, none of which in the National Museum are from Unalashka Parish.

All the Alaskan species of *Hexagrammus*, however, are present, the commonest one at Iliuliuk, known to the whites as "green-fish" and to the Russians as *turpuk*, being *H. ordinatus* of Cope. These fish remind me very much of our cunner and tautog, but they are much better than either, being more solid and less bony. Flat-fishes and flounders are very abundant, and are taken in large quantities by the spear in the evening, when they come into the shoal water close to the shore, and may be readily seen on the sandy bottom. Halibut and cod abound. The "striped fish", "yellow-fish", or "Atka mackerel" exists here in immense numbers, and deserves to become a very important element in the Alaskan salt-fish trade. It extends around the whole of the Aleutian chain and the Shumagins, congregating in great schools. At Attu it is known as the "kelp-fish," at the Shumagins as the "yellow-fish" or "striped fish," and from Unalashka to Atka as the "Atka mackerel." The last name is derived from the fact that when salted just as mackerel are salted it has the same taste. I have been told that this fish can be taken by the purse-seine, its movements being similar to those of the common mackerel. There is no doubt that if the "striped fish" was properly introduced into the market it would find a ready sale, for it is certainly an excellent fish, either salted or fresh. The fish was originally described by Pallas as *Labrax monopterygius*, and is at present known as *Pleurogrammus monopterygius*, (Pallas) Gill. Last year it visited Chernoffsky and Iliuliuk, on Unalashka Island, reappearing at the latter place after an absence of a few years. Petroff states that "full barrels of it [have] commanded the unwonted price of twenty-four dollars each in San Francisco." Mr. Robert King, agent of the Western Fur and Trading Company for the Unalashka district, writes me as follows concerning the species: "Our agent at Atka says they are there in considerable numbers, and wishes me to make preparations for taking three hundred barrels, which he thinks may be obtained in one season of say two or three months. I believe these fish are more generally distributed than has been heretofore known, as we saw young ones of the same kind at Chernoffsky on this Island, and during the last few days there have been thousands of them moving through between the cribs of our wharf." Mr. King's letter was dated at Iliuliuk, August 3, 1880.

With regard to the price offered for the salted "striped fish," there seems to be some difference of experience. Mr. Hague, general agent of the Western Fur and Trading Company, has kindly written me the following concerning them: "The best offer we have had for these striped fish is for a quantity to arrive not to exceed forty to fifty barrels at ten dollars per barrel."

Trout and salmon are among the most important fishes of the region. The red-spotted trout and all the species of *Oncorhynchus* are taken in their season. Herring are not always abundant, but that they are of unusually good quality our own experience has proven.

Sea-lions are captured at Attu, and in rather large numbers, by the Akun people, who go to Oogamak for them and for the numerous hair-seals found there. The skins of the hair-seal and sea-lion are used in making bidarkas, which are used by the sea-otter hunters who visit Sanakh.

Quite a number of young fur-seals are caught by natives off Umnak, as they travel southward from Bering Sea. The people of Makushin, too, secure between one thousand and thirteen hundred of these animals yearly on their way through Umnak Straits in the fall. The inhabitants of Borka capture from twelve hundred to fourteen hundred young fur-seals in favorable seasons as they go through Oonalga Pass.

Sea-otter are taken in small numbers by the people of Akutan around the small islands near them and on the south end of Unimak. The village of Borka secures a few sea-otter in its vicinity, and some of its people also unite with the Unalashka hunters who visit Sanakh. The Chernoffsky natives take sea-otter in Umnak Straits and send representatives to Sanakh with the

Iliuliuk parties. Koshigin gets a few of these animals yearly in the same places as those visited by Chernoffsky natives. The people of Makushin and Iliuliuk join forces in quest of sea-otter at Sanakh, where they are taken, and whence they are brought back annually by vessels engaged in the trade. The people on the southwest coast of Umnak Island secure about one hundred and fifty sea-otter yearly. Atka is largely engaged also in this chase and successfully. Trading vessels carry its hunters to the haunts of the otter, where they remain during the season, and at the end of their work they are returned to their homes. Mr. Petroff, from whom I have copied my information about the otter, fur-seal, and sea-lion, gives the catch of sea-otter in Unalashka district, from the Shumagin Islands to Attu, as forty-eight hundred and fifty for the season of 1879.

In "Notes on the Islands of the Unalashka Region" (translation from the Russian title), by Ivan Veniaminoff, Vol. II, pages 402 to 408, will be found an account of the fishes which Mr. Marcus Baker, of the United States Coast and Geodetic Survey, has had the kindness to translate for me. What the bishop says about the methods of fishing is here quoted: "The method of taking the migratory fish by the Aleuts was formerly exceedingly crude and unprofitable. They built dams in the rivers, piling large stones on a kind of float where the circumstances admitted of it, which served as a barrier to the fish going up the rivers. Standing upon this they fished with small spears pointed with iron (and formerly with bone) and barbed, thrown into the water more by chance than by choice, and when by good luck a fish was struck it was dragged ashore by a line attached to the spear. They now (1849) make use of small nets; but at the principal settlements the company has large seines, with which more fish are taken at the time when they first begin to approach the shores or enter the bays."

At the present time short seines and the ordinary fishing gear of the United States are generally employed in the fisheries. *Ukali* forms a very important part of the trader's stock at Iliuliuk.

BRISTOL BAY DIVISION.

In this division there is a total population of forty-three hundred and forty. This may be called the great lake region of Alaska, the lakes emptying through rivers into Bristol Bay. Iliamna, the largest lake, is upwards of ninety miles long, and varies between fifteen and thirty miles in width. Nushegak, the largest river, wide and deep, with rapid current and turbid waters, rushes down from Nushegak Lake to the bay, and asserts its presence far out over bars and flats. Besides the Nushegak there are seven other rivers in the division.

At Nushegak, Mr. Petroff says, the Unalashka style of bidarka is left behind, and is replaced by the one-boled "kyak," a skin canoe similar to the bidarka and similarly propelled. The spear is much used in fishing and in the capture of seal. The lance is in great demand for sealing, too.

The coast population have opportunities to take walrus, seals, beluga, and an occasional stranded whale. The settlement of Igagik, according to Petroff, devotes its time principally to the walrus hunt. At Kulluk, again, is a small population, devoted largely to the chase of walrus and seal; here the banded seal (*Histiophoca fasciata*) is found along with others. It is claimed that a fresh-water seal inhabits Iliamna Lake, but the statement needs to be confirmed by the possession of a specimen.

The principal fish of the region are flat-fish, flounders, halibut, cod, pollock, "wachua," sculpins, two or more species of "green-fish" (*Hexagrammus*), launce, capelin, trout, whitefish, salmon, and herring. In order to form some idea of the abundance of salmon one should read Petroff's description of the Igushek River and of the Togiak as well.¹ The whole region is

¹ Preliminary Report on Census of Alaska, 1881, p. 48.

abundantly supplied with choice fish, while the sea-coast is inhabited by the larger marine animals already mentioned. I have been told that Iliamna Lake is well stocked with the best of fish.

The following are some of the food-fishes of Bristol Bay division:

<i>Pleuronectes stellatus.</i>	<i>Ammodytes personatus.</i>
<i>Lepidopsetta bilineata.</i>	<i>Mallotus villosus.</i>
<i>Limanda aspera.</i>	<i>Salvelinus malma.</i>
<i>Hippoglossus vulgaris.</i>	<i>Salmo purpuratus.</i>
<i>Pollachius chalcogrammus.</i>	<i>Oncorhynchus chonticha.</i>
<i>Gadus morrhua.</i>	“ <i>keta.</i>
<i>Tilesia gracilis.</i>	“ <i>nerka.</i>
<i>Cottus polyacanthocephalus.</i>	“ <i>kisutch.</i>
<i>Gymnacanthus galeatus.</i>	“ <i>gorbuscha.</i>
<i>Hexagrammus asper.</i>	<i>Clupea mirabilis.</i>
“ <i>ordinatus.</i>	

Besides these there are some species of *Coregonus* which have not come into the United States National Museum and have not been recorded by any writer, so far as I know.

PRIBILOFF ISLANDS.

This group is so thoroughly absorbed in the important business of taking fur-seal that the trifling occupation of fishing is, for the most part, left to the small boys, and their principal catch is the skulking, rock-loving sculpin, known to the Aleuts as kah-log. They have smooth-skinned sculpins and scaled sculpins, representing the genera *Cottus* and *Melletes*, but all are kah-log. Large halibut, too large to be devoured by the roaring “lion” and the bellowing “bear,” which exterminate all the unwary small fry, are the only important fish that can be readily taken near the shores. The *bidarra* is the fishing-boat, and the fishing implements are all from the United States.

Sea-lion are taken in large numbers, and are very important for the covering of *bidarras*.

SAINT MATHEW AND SAINT LAWRENCE ISLANDS.

Saint Mathew is a great resort for walrus, and it was once supposed that fur-seal might be taken there in large numbers.

Saint Lawrence Island derives a precarious subsistence from the walrus and seal that visit its shores, and, according to Captain Hooper, are present all the year. Whales also supply a large part of the food of its people. The walrus and the seal furnish them not only with food, but also with houses, fuel, boats, and clothing. Their catch of whalebone and walrus ivory is disposed of to traders for rum, rifles, and ammunition. This island marks nearly the northern limit of the *codfish*, which is occasionally taken there.

KUSKOQUIM DIVISION.

We have here a population of thirty-six hundred and fifty-four, which is augmented during the salmon fishing to six or seven thousand, according to Mr. Petroff, from whose report I take the bulk of the information concerning the fishes of the Kuskokwim River. In the absence of collections, we know nothing definite about the species of fish, but it is reasonable to suppose that they do not differ greatly from those of the Yukon, from which we have many species, as will be seen from the list accompanying the account of that division. Salmon, trout, and whitefish are

the principal and prevailing forms, and the fact that the people of the region not only consume vast quantities themselves, but also divide their supplies with about two thousand natives from the lower delta of the Yukon, is a sufficient voucher for the wonderful abundance of fish.

The run of salmon up this stream is very great, and is long continued, the season opening in June and not closing until the end of August. The density of the population, as so remarkably portrayed in our list of the settlements at the mouth and in the immediate country adjoining, is such that in their active and energetic fishing for their own consumption they seem to absorb the greater part of this salmon run; at least the natives at the source of the river complain very often of the scarcity of salmon. Not only the people of the Kuskokwim proper fish here, but even those of the lower delta of the Great Yukon. Two thousand of them come over here to fish, making a sum total of six or seven thousand fish-eaters, consuming and wasting a quantity of salmon that should feed at least six or eight times their number were the fish canned or salted, instead of being used in their wasteful processes.¹

YUKON DIVISION.

I shall combine here the two sections of Mr. Petroff, put down as Yukon delta and Upboon mouth to Anvik, with a population of thirty-three hundred and fifty-one.

According to Petroff, hair-seals (two species) ascend the Yukon as far as three hundred to four hundred miles. White whales or beluga are abundant in the mouths of the river, where they pursue the salmon.

The number of species of marine fishes is comparatively small, while there are a goodly number of river fishes, particularly salmon and whitefish. There is generally no trouble in getting all the salmon required by the natives for bounteous subsistence, but Mr. Petroff mentions a contingency that arose last summer by which a fish famine was caused at the mouth of the Yukon. At the breaking up of the ice in the spring, it came down in such masses that it grounded in the delta in the month of July and prevented the ascent of the salmon. Natives had to seek food northward along the shore of Norton Sound and down on the Kuskokwim. To the people of the Lower Yukon the absence of fish means starvation, unless a supply can be obtained from other sources. The run of salmon in the Yukon is short, not much exceeding two months in all. Mr. Dall has published a memorandum of the trap-fishing at Nulato, on the Yukon, based upon his observations extending over several seasons, and this will give a good idea of the species taken and their relative abundance at different seasons.

NOVEMBER.—The fish-traps are set for winter. A week or two usually elapses before the trap takes any fish. The natives say that it is necessary for the resin to be washed out of the wood of which the basket and funnel are made before the fish will approach the trap. The first fish taken are the losh (*Lota maculosa*), which usually come in great numbers.

DECEMBER.—Suckers and losh predominate. A few whitefish and a straggling salmon are occasionally taken.

JANUARY.—Much the same; but the whitefish begin to be more plentiful.

FEBRUARY.—Losh scarce. The traps are filled with the different species of whitefish.

MARCH.—Much the same; but suckers begin to enter the traps.

APRIL.—Graylings and suckers very plenty; whitefish more scarce; a few losh taken.

MAY.—A few poor whitefish and small losh are taken, but the bulk of the catch is composed of graylings. Ice carries away the traps. As soon as the river is clear new traps and gill-nets are set.

¹ Petroff, Preliminary Report on Census of Alaska, 1881, p. 52.

JUNE.—King salmon appear toward the middle of the month.

JULY.—“*Hoikoh*” (*O. keta*), “redfish” (*O. nerka*), “dogfish” (*O. gorbuscha*), and a few whitefish.

AUGUST.—*Keezich* and straggling salmon of the other species. Whitefish, especially the *Luciostrutta* and *muksun*, are more abundant.

SEPTEMBER.—Salmon trout and whitefish are in their best condition and most abundant.

OCTOBER.—Much the same; but toward the twentieth of the month ice begins to form and puts a stop to fishing until it is firm enough to allow of the setting of the winter traps, which does not usually occur until early in the following month.¹

The method of making and setting the Yukon fish-traps is so well explained by Mr. Dall in the paper already quoted, that I shall simply state that the trap is essentially a double fyke-net with the fence placed at right angles with the bank of the river, catching fish either ascending or descending the stream. Gill nets and seines are used in summer. The Tinneh tribes formerly made their seines out of the inner bark of willow and alder. The Innuits made theirs of fine seal-skin strips. In localities where the river is small and narrow, the natives make what corresponds in effect with the V-shaped fish-trap of the Susquehanna and other Eastern rivers—huge bundles of willow brush are tied together and placed side by side so as to block the passage of fish completely, except at the little opening where the basket is placed. Birch canoes are used in river fishing on the Yukon.

We have little information about the running of the Yukon salmon beyond that obtained by Mr. Dall from the natives at Fort Derabin, Nulato, which follows:

“*King salmon*: Arrive at Nulato ‘when the trees have got into full leaf,’ about the 20th of June, and continue to run about three weeks. The last that come up are poor and lean. *Hoikoh*: The first arrive about the 10th of July, just as the king salmon are about gone, and they last about three weeks. Stragglers are occasionally caught as late as January. *Redfish*: This arrives about a week or ten days after the first hoikoh, and continues with the latter until about the end of August. A few straggling dogfish are occasionally caught with it, but the majority of this species do not ascend the river as high as Nulato. *Keezich*: This is the last of the salmon to ascend the river, and is obtained until the cold weather sets in and puts a stop to the summer fishing.”

The same habit of running in twos or threes instead of in schools is reported of the “king salmon” in the Yukon, as well as in the rivers of Cook’s Inlet. Capt. E. P. Herendeen told me that he has always noticed it, and he thinks the salmon follow the shore to escape the *beluga*.

The superiority of the king salmon of the Yukon has long been well known; persons who are able to secure a supply of the salted bellies from that source consider themselves very fortunate. The species seems to improve in flavor regularly to the northern limit of its distribution, although it is highly prized even on the Columbia.

The following is a list of the principal fishes of the Yukon division:

Flat-fish	<i>Pleuronectes stellatus</i> . (Marine.)
	“ <i>glacialis</i> . (Marine.)
	<i>Limanda aspera</i> . (Marine.)
Halibut	<i>Hippoglossus vulgaris</i> . (Marine.)
Polar cod	<i>Boreogadus saida</i> . (Marine.)
Wachna	<i>Tilesia gracilis</i> . (Marine.)

¹ Report of Commissioner of Agriculture for 1870 (1871), p. 392.

Barbot or losh	<i>Lota maculosa.</i> (Fresh water.)
	<i>Lycodes Turnerii.</i> (Marine.)
Sculpin	<i>Cottus polyacanthocephalus.</i> (Marine.)
	" <i>tæniopterus.</i> (Marine.)
	" <i>humilis.</i> (Marine.)
	<i>Hexagrammus asper.</i> (Marine.)
Launce	<i>Anmodytes americanus.</i> (Marine.)
Pike	<i>Esox lucius.</i> (Fresh water.)
Smelt	<i>Osmerus dentex.</i> (Marine.)
Capelin	<i>Mallotus villosus.</i> (Marine.)
Smelt	<i>Hypomesus olidus.</i> (Fresh water.)
Whitefish	<i>Coregonus Artedi.</i> (Fresh water.)
	" <i>Lauretta.</i> (Fresh water.)
	" <i>Merkii</i> , subsp. (Fresh water.)
	" <i>clupeiformis.</i> (Fresh water.)
	" <i>Kennicottii.</i> (Fresh water.)
	" <i>quadrilateralis.</i> (Fresh water.)
Grayling	<i>Thymallus signifer.</i> (Fresh water.)
Trout	<i>Salvelinus malma.</i> (Fresh water.)
Salmon	<i>Oncorhynchus chouicha.</i> (Fresh water.)
	" <i>keta.</i> (Fresh water.)
	" <i>nerka.</i> (Fresh water.)
	" <i>kisutch.</i> (Fresh water.)
	" <i>gorbuscha.</i> (Fresh water.)
Herring	<i>Clupea mirabilis.</i> (Marine.)
Sucker	<i>Catostomus longirostris.</i> (Fresh water.)
Lamprey	<i>Ammocetes aureus.</i> (Fresh water.)

According to Mr. L. M. Turner, the lamprey is very abundant at Anvik and is used for food.

Although the Ingaliaks, or the people of the great interior, are omitted here, they have an abundance of salmon and whitefish in the Upper Yukon and the Tanana.

NORTON SOUND DIVISION.

In the region embracing the coast of the Sound from Saint Michael's upward and as far as Sledge Island, Mr. Petroff reports six hundred and thirty-three inhabitants. The fishes, of course, are about the same as those mentioned in the Yukon division and need not be repeated. There is one very important fishery, the tom-cod or *wachna* fishery, which is characteristic of the region, and should be described in detail. This has already been done by Mr. Dall in the following terms:

"This fish much resembles the common tom-cod of the Eastern States, . . . but, while the latter is of most insignificant importance from its scarcity and poor quality, the former species occupies a very important place in the domestic economy of both natives and Russians on both shores of Bering Sea. It is apparently a permanent inhabitant of these coasts, but is most abundant in the fall of the year, when the ice begins to form in the rivers and along the shores. The Waiikhni fishery commences about the middle of October. At first it is caught from boats anchored close inshore, but later the natives cut holes in the new ice, set up two or three stakes, with a mat hung upon them to keep off the wind, and sit there all day, hauling them in as fast as

the line is dropped into the water. The hook is made of white walrus ivory, furnished with a sharp pin set in obliquely, but without a barb. The whiteness of the ivory, which is kept constantly in motion, attracts the fish, but no bait whatever is used. In November, when the ice becomes very thick, and the cold increases, the fish retire to deeper water, and the fishing is over until the following spring. In the summer the natives are occupied with the salmon fishery and pay no attention to these small fish. They are preserved by removing the intestines, and drying in large bunches strung on seal-line, or by throwing them as they are into long cylindrical baskets made of twisted grass, and keeping them entire in a frozen state. . . . They are among the most palatable of the many fish found in these seas, and the number preserved is so great as to be almost incalculable. They serve the natives for food either boiled or in the frozen state. They also form an important article of dog-feed in the northern portions of Alaska, near the coast. They are well suited, from their abundance and firm flesh, to be used as bait in the cod-fishery."¹

The *wachna* extends southward into Cook's Inlet, where I have seen individuals a foot in length; their average length so far as observed by me is about ten inches and their weight a half pound or less. The form is much like that of the tom-cod, but by pressing on the sides of the body a little behind the breast fins a series of small knobs will be felt on the ends of the lateral processes of the backbone; these are caused by white, spoon-shaped, flexible caps that fit on the processes and help to form a sort of roof over the abdominal cavity; the presence of these appendages makes it necessary to use another name than *Gadus* for the genus, and as Swainson has proposed to call it *Tilesia*, though on trivial grounds, his name may be used. It is usual to see traveling parties of Innuits in summer supplied with strings of *wachna* with the intestines partly removed and a very gamy flavor substituted. The hook of walrus ivory is still used, and farther north it is attached to a line of whalebone splints.

The herring run in Norton Sound is of very short duration, the fishery lasting only a fortnight, but the schools are enormously large. Seines are used in taking them. The fish are kept until they become half putrid, and are then considered at their best.

Parties traveling in summer by sea in this region are usually well supplied with a small flat-fish (*Pleuronectes glacialis*), which has a close resemblance to the "fool-fish" or "Christmas fish" of Massachusetts Bay and the Maine coast, together with *wachna* and smelt.

The sea boat in common use is the *bidarra* or *baidar* (*oomiak* of the Inuit), a flat-bottomed, walrus-skin covering stretched over a wooden frame-work and securely lashed with whalebone and seal-skin strips or sinew. Occasionally an oar is used, the wooden rowlock being lashed to a rib with thongs, but short paddles are more general. A small square sail is always used when the wind is favorable, and when not forced to embark against wind and tide the native emulates his civilized brother, and waits. The *bidarra* serves not only as a mode of conveyance by day, but also as a shelter for the night. As this boat is so largely used throughout Northern Alaska it will be of interest to quote portions of Captain Hooper's remarks on the subject:

"An ordinary *oomiak* contains, in addition to the stock-in-trade of oil, skins, etc., a tent of drilling or deer-skin, guns, traps, spears, bows and arrows, a *kyack*, a seal-skin poke filled with water, a quantity of dried meat, a sled, several pairs of snow-shoes, a fish-net, and several smaller nets for catching birds, a large drum on a pole for the use of the 'shaman,' and several seal-skin bags containing skin clothing. The *personnel* consists of three or four men, about as many women, and two or three children. Add to these two or three dogs, each with a litter of puppies, and some idea may be formed of what a traveling *oomiak* contains. The working dogs are often

¹ Report of Commissioner of Agriculture for 1870 (1871), p. 380.

left on the beach to follow on foot, which they do, keeping up a continued and most dismal howl. If the wind comes in ahead, and the natives desire, for any reason, to continue their journey, they paddle in near the shore, harness their dogs, and attach them to the oomiak, after the manner of a canal-boat and horses, settle themselves in the boat, and saying 'nakouruck' (good!), go on their way at the rate of four or five miles an hour with no other effort than steering with the paddle."¹

Fish hooks and lines also form an important part of the oomiak outfit, since fish, especially in summer, are so largely depended upon for food.

Seal, walrus, and whale, as well as *beluga*, are important objects of the chase in this division, but as the methods pursued are the same as we find farther north we will refer to this subject again.

KING'S ISLAND TO POINT BARROW.

For this extent of territory Mr. Petroff gives a total population of twenty-nine hundred and ninety. For convenience of treatment I shall subdivide the region into several smaller parts, taking up Port Clarence, Kotzebue Sound, and Arctic Alaska north of Kotzebue Sound, separately.

1. PORT CLARENCE AND VICINITY.—We must include here King's Island, one of the most remarkable human habitations in any country, with a reputed population of one hundred souls on its inhospitable cliffs. The shores are all bold, and the contour is jagged and broken. Here, in summer-houses of walrus skins, and winter burrows in the face of the cliffs, live a class of seal and walrus hunters who are said to be the bravest sailors in Alaska. I have heard it stated that men are sometimes lifted up in their kyacks by their comrades and thrown from the cliffs clear of the surf, which must roll almost incessantly around those ragged rocks. Clad in a water-proof kamlayka, or shirt made of the intestines of walrus, the hardy islander is thrown out to battle with the waves that would surely engulf a less skillful sailor. Captain Hooper says that the kyack of these people is covered with walrus hide. The bidarras have the same kind of covering, and while at sea, transporting trading goods, etc., a cover protects the cargo from breaking waves. The flesh of seal and walrus forms the principal food of these natives, but in summer a part of them may be found at Port Clarence and on the east side of the bay of which this harbor forms a portion, engaged in trading and fishing.

The skins of walrus and hair-seal are converted by these men into "luytak" which form boat-covers; these are carried off to the mainland for trade. The throat of the seal is made up by the King's Island natives into water-proof boots, which are in great demand for the use of whalers, and their seal-skin boots are largely disposed of to the same parties. The Cape Prince of Wales men are fishermen and whalers.

In the shallow, fresh-water lagoons, so plentiful on the spit protecting the western side of Port Clarence, there are great quantities of sticklebacks. The King's Island people, who were here at the time of our visit, brought to us whitefish (*Coregonus Lauretta*), smelt (*Osmerus dentex*), herring (*Clupea mirabilis*), and "wachna" (*Tilesia gracilis*). They were well provided with oil in seal-skin bags, fishing-lines, hooks, and sinkers. The sinkers were made of soft stone resembling slate, often of two colors, one light and the other dark, abruptly divided. A hole was drilled at each end and a shallow groove was made to receive the line. The holes were drilled by means of a piece of steel or iron rotated by an ivory or bone drill-bow supplied with a string of sinew. The commonest form of line was made of narrow strips of whalebone neatly fastened together. The hook is often an ivory or bone imitation of a fish, and sometimes two, sometimes four, are

¹ Report of Cruise of Corwin, November 1, 1880 (1881), p. 28.

fastened to one shank. Occasionally pieces of white and bluish stones are made the basis of support for the hooks, and great taste is shown in their arrangement. As an additional lure, we saw what was supposed to be the corneous appendage of the angle of the mouth of mormons, which, when dry, resembles in shape and color an imperfect salmon egg. The rod was not over two and one-half feet long, and the line of about ten or twelve feet was neatly folded around the ends of the rod, which were crotched to receive it. Over the jig-like hook was pulled a sheath of seal-skin as a protection against accidents.

From the settlement at Port Clarence we obtained some dressed skins of the red-spotted trout (*Salvelinus malma*), which are used for making quite ornamental water-proof vests. Small seines are used.

The following are some of the edible fishes of Port Clarence:

<i>Pleuronectes stellatus.</i>	<i>Mallotus villosus.</i>
“ <i>glacialis.</i>	<i>Hypomesus olidus.</i>
<i>Limanda aspera.</i>	<i>Coregonus Laurettae.</i>
<i>Hippoglossus vulgaris.</i>	“ <i>Merkii.</i>
<i>Boreogadus saida.</i>	<i>Salvelinus malma.</i>
<i>Tilesia gracilis.</i>	<i>Oncorhynchus chonicha.</i>
<i>Cottus polyacanthocephalus.</i>	“ <i>keta.</i>
“ <i>tæniopterus.</i>	“ <i>nerka.</i>
“ <i>humilis.</i>	“ <i>kisutch.</i>
<i>Hexagrammus asper.</i>	“ <i>gorbuscha.</i>
<i>Ammodytes personatus.</i>	<i>Clupea mirabilis.</i>
<i>Osmerus dentex.</i>	

2. KOTZEBUE SOUND.—In this body of water, especially in Eschscholtz Bay, the *beluga* or white whale is extensively taken. In the vicinity of Elephant Point we found numerous skulls of this animal lying on the beach, not far from the mouth of Buckland River.

“There are no natives living on Eschscholtz Bay, but a number are located on the Buckland River, and come down to the bay during the summer months to kill white whales (*Beluga catodon*), catch salmon, and gather berries, which they ‘cache’ until the snow comes, when they are taken to the settlement on sledges. Like all Indians, these are very superstitious. While hunting the white whale they are not allowed to chop wood, dig in the earth, sew, tan skins, and many other things, for fear the spirit that controls the movements of the white whales will take offense and not permit them to return the next season. When the whaling is completed they collect the bones and burn them; those who can afford it burn the clothes worn while whaling, the poorer natives paying tribute to the ‘god of the white whale,’ by cutting off and burning a small piece of some garment.”

“The ‘kyack’ used by the natives on Kotzebue Sound, and, in fact, along the entire coast to Point Barrow, is a marvel of speed and beauty. It is very narrow and light, and great skill is required in its management. In these fleet boats the natives easily drive the white whale, a very timid animal, into shallow water, where it is dispatched with strong, flint-headed spears.”¹

The spear-point used here for the capture of *beluga* is usually made of a brown or black stone which is very hard; this is fastened to a wooden handle, about four feet in length, by strips of whalebone. The *beluga* are hunted in kyacks; a dozen or more natives take up a position near the entrance of some bay, where they can see them as they come in with the tide. As soon as they have passed, the natives paddle out behind them, and, by shouting and beating the water,

¹ HOOPER, Report of Cruise of Corwin, 1881, pp. 24-25.

drive them into shoal water, where they are easily dispatched with flint spears. According to their tradition, to kill the *beluga* with any other weapon would entail endless misfortune upon the guilty party.¹ We might suppose that the *beluga* spear would be held in high esteem by the Inuit, but, on the contrary, it is freely bartered for a trifle of tobacco or a few percussion-caps.

In this portion of Alaska the capture of hair-seals is one of the most important native occupations. The seal is patiently watched for until it appears at its breathing-hole, when it is shot with a rifle. A very ingenious decoy used by these natives is a short piece of wood on which are fastened seal-claws, which are intended to make a scratching sound like that of the seal. Captain Hooper thus describes the movements of the seal hunter :

"The hunter approaches cautiously, by crawling over the ice, his body nearly prostrate, raised slightly on one elbow. He has a piece of bear-skin, about two feet long and a foot wide, which he attaches to his leg on the side upon which he rests; this enables him to slide more easily over the ice. The elbow rests upon a ring of grass."

As already mentioned, seal oil is carried in seal-skin pouches or bags, and the natives sometimes partly fill the bag with water and partly with oil when making preparations for trading.

The gill-nets used by the Arctic Alaskan natives for the capture of seal did not come under my observation, but those used in Plover Bay, which are similar to the Alaskan, are made of strong seal-skin line. They are about thirty to forty feet long and six deep; the bottom is furnished with stone sinkers at short intervals, and the top has a series of floats made of stuffed seal flippers; they are set off from the beach and sunk to the bottom, standing up for the seal to run into as they swim along shore in search of food. Seal-skin lines are attached to the net and held by heavy stones on the beach; with these the net is hauled in when a seal has been secured. A small stone placed on the slack of some of the hauling lines and readily displaced by the struggle of a captive shows when to take up the net. Captain Hooper says the Alaskan gill-net is set from the shore by means of a pole sixty to eighty feet long, made by joining a number of short poles together; with this the net is pushed out to its desired position and then the pole is withdrawn. The seal-skin lines are cut from a skin by passing round and round continuously. The line is then stretched between whalebone posts or large rocks, and the whole net after it is finished is folded into a narrow, long bundle, and carefully stretched between similar supports.

A glance at the map will show this region to be supplied with a few rivers, the Selawik and Finland being the largest. Selawik River communicates, through a lake of the same name, with Hotham Inlet, near the mouth of which the Finland empties also. Buckland River, a small but important salmon stream, flows into Eschscholtz Bay. These streams are well supplied with salmon and whitefish. Petroff says that "the streams or small rivers which empty into Kotzebue Sound mark the extreme northern limit of the run of salmon in America,"² but in this he was, perhaps, misled by Seemann. We took the young of the red-spotted trout at Cape Lisburne in the summer of 1880, and at least one species of *Oncorhynchus* is known from as far north as Colville River.

The species of fish observed by us in the possession of natives in Kotzebue Sound were fresh flat-fish (*Pleuronectes glacialis*) and smelt (*Osmorus dentex*) and a species of dried salmon. Dried smelt were obtained also. Most of the species recorded from the region were taken in our seine.

While in Eschscholtz Bay, natives from Cape Esenberg were there for the purpose of fishing and trading. They were well supplied with small objects made of walrus ivory, and many of

¹ HOOPER: Op. cit., p. 59.

² Preliminary Report on Census of Alaska, 1881, p. 59.

these were curiously carved to represent seal, walrus, bear, whale, and even the singular large isopod crustacean so common on all the Arctic beaches. The articles were usually intended for belt-toggles, powder-charges, swivels, lance-heads, and other useful implements, but some were representations of the human figure or other merely ornamental subject. Quantities of seal-skin line were freely traded for a mere trifle. The lance-heads usually consisted of a base of ivory or bone and an iron point.

Seemann says that herring and whiting are very abundant in Hotham Inlet. The whiting of Seemann is supposed to be *Pollachius chalcogrammus*, but there is some doubt about the occurrence of this species so far north, since none of the collectors at Saint Michael's have sent it down from their still more southern latitude. The mullet of Seemann must be a large species of whitefish (*Coregonus*). The mode of fishing in these waters is thus described by Captain Hooper:

"Salmon and other small fish are taken in nets, either by a seine in the ordinary way, or by means of a grill-net, which is set from the shore in a very ingenious manner. This net of seal thongs is from thirty to forty feet in length and about five feet wide; floats of light wood are attached to one side, with pieces of stone for sinkers on the other side, and to the outer end is secured a stone somewhat larger than the rest, serving as an anchor; a number of short poles, about three inches in diameter, are lashed together to a length of sixty or eighty feet, and the end secured to the stone anchor by means of a loop, which allows the whole pole to be withdrawn after the net is set. This pole is used for pushing the net from shore into the desired depth of water; when let go the net naturally assumes a perpendicular position. The outer end is held in place by the stone anchor, while the inner end is fastened to a line of seal-thong leading to the shore, with which the net is drawn in."

The following are some of the food-fishes of Kotzebue Sound:

Pleuronectes stellatus.

" *glacialis*.

Limanda aspera.

Pollachius chalcogrammus (doubtfully).

Boreogadus saida.

Tilesia gracilis.

Cottus polyacanthocephalus.

" *tæniopterus*

" *humilis*.

Ammodytes personatus.

Osmerus dextex.

" *spirinchus*.

Mallotus villosus.

Coregonus Laurettae.

" *Merkii*.

" *Kennicottii*.

Salvelinus malma.

Oncorhynchus chouicha.

" *keta*.

" *nerka*.

" *kisutch*.

" *gorbuscha*.

Clupea mirabilis.

3. ARCTIC ALASKA NORTH OF KOTZEBUE SOUND.—From Kotzebue Sound northward the Eskimo are engaged principally in the capture of seal, walrus, and whale. Many of them go with whaling vessels, and all who are able to do so unite with a will in taking whales during the absence of the fleet as well. In the spring of 1880, the Point Hope men sold the bone from five whales which they killed after the vessels left in 1879. Natives all along the coast from Kotzebue Sound up are supplied with whaling gear such as the whites use, and in their trustworthy oomiaks they show great skill and courage in this chase. Whalebone is brought out to every vessel that comes in sight anywhere in the Arctic. The season of 1880 was a remarkable one for all concerned in the fishery; the Eskimo were fairly gorged with blackskin and blubber, while every sail carried away a heavy cargo of oil, bone, and ivory. On the 20th of August, 1880, the settlement of Point

¹Report of Cruise of Corwin, 1881, p. 59.

Hope showed no signs of life, the natives being off fishing, hunting, and perhaps trading. There were plenty of drying-frames, and at various points along the low shore were large conical piles of drift-wood.

The spear-points observed at Cape Lisburne were made of copper or iron in a bone socket. Sometimes chert or some other hard stone replaces the metal. At Icy Cape a great number of chert flakes were found at an old Eskimo encampment, where the spear-maker had been at work. The pole to which the head is attached is usually nearly six feet long, the shank forming a socket fitting on a pivot on the pole and firmly lashed on. To the pole is fastened, by seal-skin thongs, an inflated seal-stomach. The natives throw these lances into a whale and the buoys prevent his sinking very far; each time when he comes up to breathe more and more lances are thrust into him, until finally the death stroke is given. The flesh and blubber are common property; the whalebone belongs to the captors of the animal. The jaw-bone is used for various purposes; cut into strips of suitable thickness, it is employed for shoeing sled-runners; the ribs and parts of the jaws are frequently planted in the ground in a circle for the frame-work of winter dwellings; blubber-holes are secured by a covering of similar bones; ribs also are sunk upright into the ground to serve as posts for stretching lines and for supports of various kinds. It is hard to tell whether the Eskimo prefer whale meat fresh or tainted; they eat it very freely and with apparent relish when it becomes simply revolting to our taste. The crisp, hard cracklings left by the whalers after trying out the oil are eagerly sought for by traveling parties.

The walrus and the seal are of more importance to the Eskimo than the whale, both of them being more readily obtained and supplying a greater number of wants. The flesh of the whale of course serves as food, the oil as food and fuel, the bone for house-frames and certain utensils, the baleen as an article of trade; but whales are hard to capture and are not to be depended upon, while walrus and seal, judging from the numerous remains of these animals found wherever we landed on the Arctic shores, and from the numberless appliances for which they serve, are the great essentials, not only to the comfort, but to the very existence of the natives. To use the language of Captain Hooper: "The seal may be called the mainstay of the Innuits of Arctic Alaska. The flesh and oil form his chief articles of subsistence; the skin furnishes him clothing, tents, and boats; cut into thongs, it is used to make nets for catching fish and birds. The oil is also burned in lamps (*nannue*), which light and warm the *tupecks* during the long, dark winter nights."¹

In the vicinity of Icy Cape we saw great quantities of broken skulls of walrus and seal and of polar bear. Heaps of burned bones were quite frequent; the natives burn the bones to appease the spirit dwelling in the animal, fearing a failure in their future hunting if this mark of respect be withheld.

Walrus ivory has many uses besides that of a basis of trade; whole tusks of the proper shape are formed into handsome and very effective ice-picks; snow-knives, resembling somewhat in shape the throw-sticks of some Indians, are made of this ivory; numberless implements of small size but great usefulness are manufactured from the same material.

The number of species of edible Arctic fishes is small, and there is no question that fish-food is much less important to those Innuits than the flesh of seals and walrus, but it is consumed in considerable quantities and forms a very agreeable variation from the ordinary diet. Two species of flat-fish are known to be abundant, and the small polar cod is superlatively so. Two sculpins named in the appended list (species of *Cottus*) reach a large size and they are very common. All

¹ Report of Cruise of Corwin, 1881, pp. 58, 59.

the lagoons observed by me were well filled with sticklebacks and young sculpins. Lant and capelin abound. Smelt and grayling are reported as far around as Colville River by Capt. E. E. Smith, ice-pilot of the *Corwin* in 1880. A species of whitefish (*Coregonus Laurettae*) was obtained in abundance by Captain Hooper from natives at Point Barrow. We took the red-spotted trout in our seine, and Captain Smith reports it from Colville River, where he also secured herring and humpback-salmon (*Oncorhynchus gorbuscha*). Seemann has declared that salmon are not found in Alaska north of Kotzebue Sound. This is an error; we found remains of a species of *Oncorhynchus*, which I believe to be *gorbuscha*, at Icy Cape, and Captain Smith, referred to above, salted in 1875 two barrels of humpback salmon which he bought at the mouth of Colville River. Concerning the whitefish of Point Barrow, Captain Hooper in his report, already referred to, says: "We bought from the natives . . . some fish resembling shad, but smaller and very fat; they differ also from the shad in having two (dorsal) fins. We saw the same species in Kotzebue Sound and at other places within the Arctic circle. They are called by the natives *tupook*."

Farther on he writes thus: "The salmon is the only variety of fish in the Arctic that is of any value. Although smaller than the salmon caught farther south, they are of fine flavor. They are quite plentiful, and the coast natives cure large quantities of them by smoking and drying for winter use."

The list of fishes given includes only such food-fishes as are known to occur; there are no doubt others which will be discovered by collectors in the future. The methods of capture do not differ from those already described, seines, gill-nets, hooks, and spears being employed just as they are farther south.

The following is a partial list of Arctic-Alaskan fishes:

<i>Pleuronectes stellatus</i> .	<i>Osmerus dentex</i> .
" <i>glacialis</i> .	<i>Mallotus villosus</i> .
<i>Boreogadus saida</i> .	<i>Coregonus Merkil</i> .
<i>Lycodes coeruleus</i> .	" <i>Laurettae</i> .
<i>Cottus polyacanthocephalus</i> .	? <i>Thymallus</i> . (<i>Fide</i> Smith.)
" <i>tæniopterus</i> .	<i>Salvelinus malma</i> .
" <i>humilis</i> .	<i>Oncorhynchus gorbuscha</i> .
<i>Gymnacanthus pistilliger</i> .	<i>Clupea mirabilis</i> .
<i>Ammodytes personatus</i> .	

17. STATISTICS OF THE ALASKAN FISHERIES IN 1880.

Salmon exported from Alaska, 1880.

	Month.	Barrels.	Number.	Pounds.
Karluk River Fishery, Smith & Hirsch.....	June.....	125 ¹	37,500	375,000
Do.....	August.....	369	10,950	199,500
Do.....	September.....	415	20,750	207,500
Karluk River Fishery, Western Fur and Trading Company...	June.....	265	20,000	200,000
Do.....	July.....	240	12,000	120,000
Do.....	August.....	150	7,500	75,000
Kassilov Fishery, Western Fur and Trading Company.....	July.....	160 ²	8,000	320,000
Do.....	August.....	185 ³	18,500	185,000
Kenai River Fishery, Alaska Commercial Company.....	150 ²	7,500	300,000
Total.....		2,089	151,700	1,862,000

¹ Barrels of bellies.

² Chowichee bellies.

³ Silver or keesitch.

Fish exported from Alaska, 1880.

Name of company.	Herring.		Halibut.		Cod.			Frost fish.	Salmon trout.	Salmon.	
	Smoked.	Salted.	Smoked.	Fins and napes.	Dried.	Boneless.	Tongues.			Smoked.	Salted.
	Boxes.		Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Barrels.	Barrels.	Pounds.	Barrels.
Alaska Commercial Company.											150
Smith & Hirsch.											939
Western Fur and Trading Company.	500	pounds, 2,500 1/2-barrels, 6 barrels, 18	500	250	3,000	10,500	250	2 1/2	7 1/2	4,000	1,000
											2,089
Value.....		\$180	\$30	\$25	\$40	\$505	\$25	\$17	\$75	\$200	\$19,820

* 2,089 barrels equal 151,700 fish, equal 1,952,900 pounds.

18. TABLE SHOWING THE GEOGRAPHICAL RANGE OF FOOD-FISHES IN ALASKA.

Names.	Stikine River.	Wrangell.	Sitka.	Port Althrop.	Yakutat Bay.	Cook's Inlet.	Katmai.	Kodiak.	Belkofsky.	Shumagina.	Unalaska.	Atka.	Kyska.	Amchitka.
<i>Pleuronectes stellatus</i>			x		x	x		x			x			
" <i>glacialis</i>								x						
" <i>quadrituberculatus</i>								x						
<i>Lepidopsetta bilineata</i>			x		x	x		x		x	x			
<i>Limanda aspera</i>			x					x		x	x			
<i>Hippoglossoides elaeodon</i>								x		x	x			
<i>Hippoglossus vulgaris</i>			x	x		x		x		x	x			
<i>Atheresthes stomias</i>								x		x	x			
<i>Pollachius chalcogrammus</i>						x		x		x	x			
<i>Boreogadus saida</i>														
<i>Gadus morhua</i>			x		x	x		x	x	x	x			
<i>Microgadus proximus</i>					x									
<i>Tilesta gracilis</i>						x		x						
<i>Lota maculosa</i>														
<i>Lycodes Turnerii</i>														
" <i>coccineus</i>														
<i>Cottus polyanthocephalus</i>			x		x	x		x		x	x			x
" <i>taniopterus</i>														
" <i>niger</i>										x				
" <i>humilis</i>														
<i>Gymnascanthus pistilliger</i>											x 1			
" <i>galeatus</i>											x			
<i>Hemilepidotus trachurus</i>			x	x		x							x	
" <i>Jordanii</i>				x		x		x		x	x			
<i>Molletes papilio</i>														
<i>Schastichthys maliger</i>			x											
" <i>caurinus</i>			x											
" <i>brevispinis</i>				x										
" <i>melanops</i>			x					x						
" <i>ciliatus</i>								x						
<i>Hexagrammus asper</i>			x		x	x					x	x		
" <i>ordinatus</i>			x							x	x			
" <i>superciliatus</i>			x		x			x			x			
" <i>scaber</i>											x			x
" <i>decagrammus</i>			x	x						x	x			
<i>Pleuragrammus monopterygius</i>								x		x	x	x		

FISHING-GROUNDS OF NORTH AMERICA.

Table showing the geographical range of food-fishes in Alaska—Continued.

Names.	Sickens River.	Wrangell.	Sitka.	Port Althrop.	Yakutat Bay.	Cook's Inlet.	Katmai.	Kodiak.	Belkoff Bay.	Shumagin.	Unalaska.	Atka.	Kyaka.	Anchitka.
<i>Ophiodes elongatus</i>			x											
<i>Anoplopoma fimbria</i>			x											
<i>Bathymaster signatus</i>			x											
<i>Ammodytes personatus</i>			x			x		x		x	x			
<i>alascanus</i>			x											
<i>Esox lucius</i>														
<i>Osmorus dentex</i>														
<i>spirinchus</i>														
<i>Mallotus villosus</i>			x			x		x						
<i>Hypomesus olidus</i>														
<i>protioana</i>					x									
<i>Thaleichthys pacificus</i>	x	x	x	x			x							
<i>Stenodus Mackenzii</i>														
<i>Coregonus Lauretta</i>														
<i>Morkii</i>														
<i>Nelsonii</i>														
<i>Kennicottii</i>														
<i>quadrilateralis</i>														
<i>Thymallus signifer</i>														
<i>Salvelinus malma</i>			x	x		x		x		x	x		x	
<i>Salmo purpuratus</i>			x					x						
<i>Gairdnerii</i>			x					x						
<i>irideus</i>			x											
<i>Onchorhynchus chouicha</i>						x		x		x	x			
<i>keta</i>			x			x		x						
<i>nerka</i>									x		x			
<i>kiautich</i>			x		x						x			
<i>gorbuscha</i>						x		x						
<i>Clupea intrabilis</i>			x	x	x	x		x			x			
<i>Catostomus longirostris</i>														
<i>Ammocetes aureus</i>														
Total.....			28	8	10	17	1	25	4	16	24	2	2	2

[illegible]

Table showing the geographical range of food-fishes in Alaska—Continued.

Name.	Attu.	Saint Paul Island.	Saint Lawrence Island.	Saint Michael.	Yukon River.	Port Clarence.	Kotzebue Sound.	Diomedes.	North Alaska.	Cape Lisburne.	Point Barrow.	Point Barrow.	Colville River.	Coppermine River.
<i>Lycodes Turnerii</i>				x				x						
" <i>coccineus</i>				x				x						
<i>Cottus polycanthocephalus</i>				x							x			
" <i>teniopterus</i>				x							x			
" <i>niger</i>		x					x				x			
" <i>humilis</i>				x			x				x			
<i>Gymnacanthus pistilliger</i>														
" <i>galeatus</i>														
<i>Hemilepidotus trachurus</i>														
" <i>Jordanii</i>		x												
<i>Melletes papilio</i>														
<i>Sebastes maliger</i>														
" <i>caurinus</i>														
" <i>brevispinis</i>														
" <i>melanops</i>														
" <i>ciliatus</i>														
<i>Hexagrammus asper</i>				x		x								
" <i>ordinatus</i>														
" <i>superciliatus</i>	x													
" <i>scaber</i>														
" <i>decegrammus</i>														
<i>Pleuragrammus monopterygius</i>	x													
<i>Ophiodon elongatus</i>														
<i>Anoplopoma fimbria</i>														
<i>Bathymaster signatus</i>														
<i>Ammodytes personatus</i>						x					x			
" <i>alascanus</i>														
<i>Esox lucius</i>					x									
<i>Osmerus dentex</i>				x		x								
" <i>spirinchus</i>							x							
<i>Mallotus villosus</i>				x						x	x			
<i>Hypomesus olidus</i>				x										
" <i>pretiosus</i>														
<i>Thaleichthys pacificus</i>														
<i>Stenodus Mackenzii</i>					x									
<i>Coregonus Lauretta</i>					x	x						x		
" <i>Merkii</i>				x					x					
" <i>Nelsonii</i>					x							x		
" <i>Kennicottii</i>					x							x		
" <i>quadrilateralis</i>					x									
<i>Thymallus signifer</i>					x								x?	
<i>Salvelinus malma</i>					x	x			x	x			x?	
<i>Salmo purpuratus</i>														
" <i>Gairdnerii</i>														
" <i>irideus</i>														
<i>Oncorhynchus chonicha</i>					x									
" <i>keta</i>				x					x					
" <i>nerka</i>														
" <i>kisutch</i>														
" <i>gorbuscha</i>													x?	
<i>Clupea mirabilis</i>				x		x							x?	
<i>Calostomus longirostris</i>					x									
<i>Ammocetes aureus</i>					x									
Total.....	2	3	1	15	12	8	4	1	5	3	6	3	5	1